ISAKOS

ISAKOS NEWSLETTER 2023 • VOLUME I

Current Concepts on Arthroscopy, Knee Surgery & Orthopaedic Sports Medicine

WELCOME!

ISAKOS CONGRESS 2023

Boston
Massachusetts
June 18–June 21

PG 38 **TITLE IX LEGISLATION:** GENDER DIVERSITY TASK FORCE

INTERNATIONAL SOCIETY OF ARTHROSCOPY, KNEE SURGERY & ORTHOPAEDIC SPORTS MEDICINE • 1995 •

INSIDE

in this issue

International Society of Arthroscopy, Knee Surgery and Orthopaedic Sports Medicine

isakos@isakos.com

ISAKOS is BACK!!

It is very exciting to be back in person for our 2023 biennial ISAKOS Congress in Boston, USA. This will allow for in-person meetings, networking, socializing and interactions we have all been missing for the past couple of years. Some of the highlights of our meeting include live and virtual reality surgical demonstrations, small group discussions on complex cases, a battle of knee arthroplasty robots, Meet the Expert sessions, research symposia, and of course, paper presentations on the latest cutting-edge research from around the world. The multiple instructional courses and symposia will cover all the current controversies and hottest topics in arthroscopy, knee surgery and orthopeadic sports medicine.

The Congress is also the time that the baton is passed from the current President to the incoming President who will lead our society for a two-year term. In Boston, Dr. Guillermo Arce from Argentina will transfer the leadership of the society to Dr. David Parker from Australia. I would like to thank Dr. Arce for his excellent and tireless work during a very difficult stretch of time for us all. We also extend a warm welcome to Dr. Parker as he takes over and we look forward to better times ahead. I would like to thank Dr. Niek van Dijk again for his incredible effort as Editor-in-Chief of *JISAKOS* (the ISAKOS society journal). He will be stepping down in 2023 and a replacement will be named. Starting a medical journal from scratch is not an enviable task, but Niek was successful thanks to his tremendous work ethic, high scientific standards, and his ability to surround himself with an excellent team of people. We extend our gratitude to Drs. Arce and van Dijk for their excellent work and look forward to a new era, starting now!

See you in person soon!

Robert G. Marx, MD

ISAKOS Newsletter Editor
UNITED STATES

Join a LIVE Webinar!

New Insights in Multi-Ligamentous Ankle Injuries
Offered in collaboration with ESSKA
March 22, 2023 | Tentatively, 17:00 UTC

Maximizing the Impact of Your Research
Featuring editors from *JISAKOS* & *AJSM*
April 20, 2023 | 20:00 UTC

Innovation and Technology in Orthopaedic Sports Traumatology from the Perspectives of Young Professionals
May 18, 2023 | 14:00 UTC

ISAKOS Webinar Collection

Available on Global Link! View the entire collection of webinars presented by the ISAKOS Committees and featuring world-renowned faculty discussing a variety of current trends and techniques.

Register at isakos.com/webinars

ISAKOS
WEBINARS

Guillermo Arce, MD
President, 2021–2023
Buenos Aires, ARGENTINA

ISAKOS Stays Active Worldwide with New Educational Formats

ISAKOS continues to deliver orthopaedic sports medicine education worldwide. I was excited to see ISAKOS close out 2022 with **several new educational events,** including our **first-ever ISAKOS Knee Arthroplasty Forum (IKAF) in Chile**, which I attended along with more than 250 participants at this 2-day course in Viña del Mar. I would like to express my appreciation to Past President Willem van der Merwe for being the driving force that initiated the planning and to the four chairs on the passionate organizing committee for this first-time event. I also must thank and congratulate David Figueroa, Willem's co-Forum Director, and our local host. He did fantastic work for many months, attracting support and registrations while working with the ISAKOS Office and our local PCO to take care of every detail. As a result, the course organization and friendly atmosphere couldn't have been better. The next IKAF may be more extensive and more international, and it may draw even more participants, but this one was a marvelous and unforgettable experience.

We also offered two surgical skills courses with partner societies in late 2022. The first, **an ISAKOS surgical skills lab that was offered as a pre-course for the TOSSM/APKASS Congress in Thailand, was extremely successful.** David Parker's incredible work organizing the local leaders and securing industry collaboration was invaluable. I thank David and the ISAKOS faculty, whose extraordinary efforts made this course successful. TOSSM and the local university lab were excellent organizing partners for this course, and the feedback from the local faculties and attendees was very satisfying, with all participants reporting that they were happy and grateful for the opportunity to learn. **Participating in a hands-on cadaver lab is still the #1 educational wish among the arthroscopy community around the world.**

I was also excited to help plan and deliver **ISAKOS's first 2-day knee and shoulder lab course with AANA in Miami, Florida, USA**, which attracted participants from more than 15 different countries worldwide. I am grateful to the ISAKOS and AANA faculty who joined me, along with my course co-chairs John Lane from ISAKOS and Larry Field and Nicholas Sgaglione from AANA, as we provided instruction in both English and Spanish, both on-site as well as through valuable pre-course videos that were posted online in advance of the course.

Throughout the three ISAKOS events mentioned above, ISAKOS explored totally new educational formats. During the two hands-on labs in Bangkok and Miami, 5-minute presentations focused on surgical techniques in English and Spanish were delivered to the registrants in advance. Therefore, during the event, 100% of the time was dedicated to hands-on surgical skills training on the specimens. At the Knee Arthroplasty Forum in Chile, all lectures about techniques and evidence-based data were delivered previously to the registrants in order to allow for face-to-face meetings to discuss problem cases. This approach made the IKAF the most interactive meeting in the field.

I ended the year representing ISAKOS in Asia, where I was invited to present at the **Singapore Orthopedic Association's Annual Scientific Meeting** in Singapore last December. I gave a Presidential Lecture about the Best Techniques for Biceps Tenodesis immediately following the opening welcome by SOA President Prof. Denny Lie (ISAKOS Shoulder Committee Member). It was an honor to be the sole honorary lecturer to help kick off the start of their meeting and bring ISAKOS awareness to Singapore.

In February, I represented **ISAKOS in the Middle East at the Arab Health Congress in Dubai.** I attended as ISAKOS faculty at the request of the local host, Philippe Landreau, a valued member of the ISAKOS Board of Directors. Shortly after that, in March, ISAKOS partnered with **AOSSM to plan our first involvement in a Specialty Day program at AAOS** in Las Vegas, kicking off several activities we have planned for 2023 with this special U.S.-based partner society!

As you can see, to fulfill its mission, ISAKOS remains globally active and engaged—both in-person and online—in order to ensure that we are collaborating with partners to educate surgeons in all corners of the world. ISAKOS is truly a global organization—linking with members and non-members, regional and partner societies, companies, and industry—making it our priority to educate as many as possible and, ultimately, ensure better patient care worldwide.

Don't miss the opportunity to join us at our **Biennial Congress in Boston, June 18 – 21.** The Program Chairperson, Mark Clatworthy, and his team have prepared an exciting program that will make your participation an unforgettable experience.

Thank you for your involvement and interest in our powerful society and for entrusting me to be your society President for the last two years. Let's continue to work together to achieve ISAKOS's mission!

Interview with *JISAKOS* Editor in Chief, C. Niek van Dijk

C. Niek van Dijk, MD, PhD
Abcoude, NETHERLANDS
Editor in Chief, *JISAKOS*
c.niekvandijk@jisakos.com

ISAKOS recently interviewed Dr. van Dijk for a podcast to have him reflect on his time as Editor of the *Journal of ISAKOS*. He has recently announced his resignation, and the society is currently accepting applications for the next Editor in Chief (EIC) of the Journal. This issue's article features a transcript of that interview. It has been edited for clarity and brevity.

1. What initially excited you about becoming the EIC for *JISAKOS*?

To be honest, I never imagined myself as an Editor, so when I was asked by the ISAKOS leadership to do so, I had to make a switch in my head. Talking with editors of other journals—Jon Karlsson (*KSSTA*), Bruce Reider (*AJSM*), and Jim Lubowitz (*J Arthroscopy*)—gave me confidence and convinced me that I could do it. And when I dug into it further, I became really excited. I mean, what is nicer than getting carte blanche to set up a new journal from scratch? I was excited to have the opportunity to build our editorial team, set up our Editorial Board (EB), choose the type of articles that we were going to publish, work with the team to decide which authors to invite, and determine which reviewers to perform peer review. It was a huge responsibility but was very rewarding!

2. Can you briefly describe what it is like to be the EIC for an international journal?

Being an EIC of an international journal is like leading a department. You lead not only an Editorial Board but also a team of associate editors and handling editors, social media editors, a video editor, and a statistics editor.

Apart from that, you need to be in close contact with the publisher and the ISAKOS Office (almost weekly and often multiple times a week). You also need to connect regularly with ISAKOS Board of Directors (BOD) and the *Journal of ISAKOS* Board of Trustees (JIBOT), which serves as the journal advisory board) and regularly provide them with an updated publishing report.

You also need to remain in close contact with committees, particularly when working on Theme Issues. Finally, you also need to remain in regular contact with authors and reviewers and, of course, our managing editor Leendert Blankevoort and the production team for the production of our 6 issues.

As EIC, you also serve as an ambassador for the Journal. This means networking at congresses, taking part in the scientific programs of sister organizations, attending sessions to see where the field is going, recognizing new fields and hot or controversial topics, and spotting expert authors to invite to submit to the journal.

The EIC is responsible for the peer review and editorial processes and working with the team to ensure the speedy and correct handling of manuscripts. It is important to select a sufficient pool of reviewers, monitor their quality, and provide them with feedback on their performance.

The EIC organizes symposia during our biannual congresses as well as webinars focusing on topics such as publishing best practices and how authors should prepare a manuscript in order to maximize its chances of being accepted for publication.

Finally, the EIC and team are responsible for ensuring that the journal is a high-quality product, maintaining high standards at all levels, and always striving for improvement. As such, we must keep our eyes and ears open, see where the field is moving, spot new developments, identify areas of controversy, and keep track of new editorial developments, including what our competitors and other journals in our field are doing.

3. What do you feel has been your greatest achievement as EIC?

First of all, it is teamwork. It is not my achievement, but rather a team achievement.

We started with only invited reviews and transformed *JISAKOS* into a highly respected peer-reviewed journal that is now indexed in PubMed as well as the Emerging Sources Citation Index, and we are about to receive our first Impact Factor.

We have a unique article mix that makes us stand out from our competitors. Specifically, the State-of-the-Art (SOTA) article structure distinguishes *JISAKOS* from other journals in that it provides an analysis of the present state of diagnosis and treatment, the pros and cons of various alternatives, and future possibilities for the field on a specific topic. These articles are written by 3 experts from 3 different continents, providing a global perspective for future directions and highlighting regional differences, if present.

From the start, our motto was "The first choice is on Quality." This motto serves as the governing principle for all of our decisions, whether it is the choice of EB members, the choice of reviewers, the choice of article types, the layout of the articles, and, most importantly, the manuscripts that we publish. I am proud that we have never had to compromise our motto.

When we started the journal, not everyone was convinced of the need of yet another journal in this field. But I feel that such skepticism has disappeared as the journal has grown into one of the most important assets for ISAKOS – maybe not yet financially, but by providing ISAKOS with a solid scientific foundation as well as a fantastic platform to the outside world through Science Direct and other OA channels to showcase our endeavors. The journal is a fantastic platform for ISAKOS members but also for our committees and their Theme Issues. This is a crucial aspect of the society because it is the most visible offering that ISAKOS provides to the surgical community.

4. And what about your editorials? They were always among the most downloaded articles of the Journal.

Editorials and editorial comments play an important role for a journal. If we receive an important article on a hot or controversial topic, then we invite one or more experts to comment on it, to place it in context, to provide a counterbalance, or to just highlight the importance of the subject. To be able to do this, a journal needs a certain backlog in order to provide these experts with the time needed to write the editorial comment. In the early years, we simply did not have that backlog. By writing them myself, I was in control of the deadline, which was often a matter of days rather than weeks. I limited myself to topics that were within my comfort zone. The feedback was very supportive, which stimulated me to continue and combine them with the conventional multiauthor editorials.

The topics were often broader than the technical part of our field and included the current war in Europe and its implications on science, Covid and the future of conferences, the high rates of burnout and divorce among surgeons, scientific misconduct (including conscious bias, plagiarism, and falsification of results). The piece on "Shifting Paradigms" touched upon another important topic—specifically, that scientists tend to protect their own theories and to stick to the paradigms to which they are attached because surgeons are human and science is driven not just by cold logic but also by psychology. The piece entitled "Human All Too Human" focused on the fact that, while we expect reviewers to always be rational, they are human—so, if you as an author disagree with a reviewer's decision for a good reason, then you can always start a discussion. The piece on "minimalism and the art of medicine" deals with the fact that we should limit ourselves to do what is really necessary, that we should not do too much, and that we should "Keep it Simple, Stupid." The piece on "less is more" touches upon the idea that "Why to do it" is more important than—or at least as important as—"How to do it." The piece on unnecessary surgery ("To Operate or Not to Operate? That is the Question") reflects one of my personal paradigms given that it has been estimated that at least 30% of surgical interventions are unnecessary. The piece dealing with the forgotten art of history-taking and physical examination ("Treat Your Patient, and Not His MRI!") emphasized the importance of listening to the patient. The piece on hyaluronic acid ("But It Does Work [and We Know That It Does])" was a plea for the AAOS to revise its position about HA for patients with Kellgren Grade-II and Grade-III osteoarthritis—if not for all HA, then at least for the second-generation HMW cross-linked versions. The piece entitled "From Painkiller to Killer: the 'Oxy' Case" was a vehicle to underline that change begins with yourself. After all, we are the center of the system. We have a moral and professional duty to act in the best interest of our patients. Our patients must be able to trust that we will always do the right thing. It has been a great privilege that *JISAKOS* has given me the platform to touch upon such important topics. Looking forward, I draw your attention to the editorial in one of the upcoming issues, entitled "From Big Hands to Green Fingers: It Is Time For a Change."

5. What has been the biggest challenge?

To get everyone aligned. In 2016, when we started, not everyone was convinced of the need for our own journal. The sentiment was that "We have so many journals already, why yet another journal?" Committees were largely involved with the 12 to 15 books that ISAKOS produces every 2 years. With an average of 25 chapters per book, committee members were involved with writing >300 chapters during each 2-year period! It took some time to convince the Board and Committees to redirect their energy towards the journal.

For the first few years, we could not publish original research articles due to the ongoing contract with *J Arthroscopy.* We could only publish commissioned articles. I am still very grateful for all of the authors who submitted their systematic reviews, classic articles, and SOTAs (State-of-the-Art articles). Every 2 months, we were able to publish 64 pages with meaningful quality content. We never missed the deadline, but it was often close.

Finding excellent reviewers was not a problem, but it was a challenge to receive their reviews on time.

6. What advice do you have for any potential candidates or people thinking of applying for the role?

Don't take it lightly. Take it seriously. It is a serious job. You are the leader of an enterprise with all of its implications and responsibilities but also all of its possibilities. I enjoyed every minute.

7. Where do you feel *JISAKOS* still needs to grow or evolve to become better?

At the start of our journal in 2016, our vision was for *JISAKOS* to develop into a journal with a worldwide reputation for editorial excellence and applicability to patient care that would meet the specific needs of ISAKOS members.

And that has not changed. We need to continue to cater for the specific needs of our ISAKOS members. We want to present the global perspective. Where we can improve is on social media. We have a great team of social media editors, but the EIC also has an important role. As EIC, it is important to be personally active on social media.

The time to first decision needs improvement. We could add Editorial commentaries to articles and add a Letters to the Editor section. I would like to see more interaction between the biannual ISAKOS program and the *JISAKOS* and old *JISAKOS*-branded sessions at our biannual congress in the following areas:

- Controversial topics (pro/con debates), which EB members can easily spot from the content of our journal
- Emerging techniques/interesting developments
- *JISAKOS* literature review (pro/con debate on the top-5 papers)

I believe that it is important to develop incentives to encourage submissions of Congress presentations and to ask presenters to convert their research into a scientific article and provide *JISAKOS* with a first right of refusal (or acceptance!). Other ideas are to organize webinars on controversial/emerging/hot topics and to expand our podcast with pro/con discussions on recent published articles, with involvement of EB members.

It is important to encourage even more involvement on the part of the ISAKOS clinical committees. Members of ISAKOS committees are the very best specialists in the world, and the level of activity and commitment among our committee members has traditionally been very high. We should make even more use of their expertise, drive and knowledge. I strongly believe that, with their involvement and the fact that we are an Open Access (OA) journal, *JISAKOS* will grow to become the strongest and best journal in our field.

We have a unique article mix, with original research, systematic reviews, and current concepts on the one hand as well as case reports, the Classic, and video techniques on the other hand. The EIC and editorial team are able to spot hot, controversial, or new topics and invite authors to submit articles. Our global network and highly active committees of experts enable us to do what others can't do, for example, SOTA articles and our Theme issues, both of which are commissioned.

These elements, together with our association with the best publisher (Elsevier), are a recipe for success.

8. What are you looking forward to most after retiring from the position?

More time for my family, friends, cycling, sailing, and teaching.

9. Any final messages for the people looking to fill your shoes?

It is a very rewarding and wonderful position. You really can make a difference.

I will especially miss the human interaction with colleagues, friends, and scientists from all over the world.

If you don't have that time, don't do it. You cannot do the job exclusively in the evening or over the weekend. And I expect the journal to grow fast. Within 5 years, I expect that we have some 500 submissions, and in 10 years we will have >1,000 per year. You need to have the time to read all of the articles as well as judge, edit, and manage them.

It is a position of responsibility: authors have to rely on a fair and honest treatment and handling of their manuscripts on which they worked for many years. So you need to always approach them with respect.

I strongly believe that each organization can benefit from new leadership. It is not for nothing that ISAKOS presidents serve for a maximum of 2 years. ISAKOS leaders serve for a maximum of 8 years in the presidential line. In June 2023, I will have served for 8 years as *JISAKOS* EIC and I will be happy to leave my shoes for a new EIC with new and fresh ideas. I am convinced that *JISAKOS* will benefit from it.

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jisakos.org

Peter J. Fowler, MD, FRCSC 1938–2022

In Memory of the First President of ISAKOS, 1995-1997

Dr. Peter Fowler was an icon in sports medicine. Dr. Fowler began his career as the first orthopaedic surgical resident at the University of Western Ontario, under the mentorship of the late Dr. Jack Kennedy. Dr. Fowler went on to perfect surgical techniques and rehabilitation and spent his entire career at Western University as a full professor in the Schulich School of Medicine and Dentistry. In 1995, Dr. Fowler's dream of starting a clinic came true with the opening of the Fowler Kennedy Sport Medicine Clinic. That same year, Dr. Fowler became the first president of ISAKOS, after the society's creation following the merger of ISK and IAA. Dr. Fowler went on to become elected as the president of the American Orthopaedic Society for Sport Medicine — one of only three Canadians to be honored with this position. Dr. Fowler was also a founding member and president of the Canadian Academy of Sport and Exercise Medicine. In 2018, Dr. Fowler was appointed to The Order of Canada to honor his pioneering work in developing sports medicine.

A talented surgeon and clinician, Dr. Fowler was most distinguished and passionate as a surgical educator. He trained hundreds of young surgeons—his graduates include many key opinion leaders and society presidents across Canada and around the world. Dr. Fowler's former students even formed a society called "Fowler Fellows" and continue to meet to share research and stories of their time with Dr. Fowler.

Beyond orthopaedics, Dr. Fowler was an award-winning swimmer and went on to represent Canada at two Pan-Am Games, bringing home a silver medal. He also served his country as Chief Medical Officer for the Canadian Olympic Team in Calgary and at the Commonwealth Games in Kuala Lumpur. He was also an esteemed researcher with several hundred peer-reviewed papers and dozens of book chapters. Whether his patient was a Canadian Olympian, a professional athlete or a weekend warrior, Dr. Fowler's approach and attention to detail was the same. He was a kind and caring individual who will truly be missed.

Learn more about Dr. Fowler's life and achievements as Dr. Ned Amendola, USA, interviews Dr. Fowler for ISAKOS's first ever episode of the **Giants in Orthopaedic Sports Medicine video** series in 2020.

Available at isakos.com/GlobalLink.

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WELCOME TO BOSTON!

On behalf of the community of ISAKOS, we welcome you to the 14th Biennial ISAKOS Congress! The ISAKOS Congress embodies the fraternity and international exchange of ideas that ISAKOS is known for.

Throughout time, Boston and Massachusetts have played an important part in the history of the United States. Founded in 1630, just ten years after the Pilgrims landed at Plymouth, the city grew as a harbor town strongly linked to the sea. Whale watches, harbor cruises, tours of the Boston Tea Party Ship, island hopping, sailing and rowing on the Charles River, touring the U.S.S. Constitution, jogging, cycling or playing in one of the many parks along the waterways gives visitors plenty to do to discover Boston's nautical history. Surrounded by natural beauty, Boston's 48 square miles are encircled by a bustling harbor, tranquil coastline and a strand of green parks designed by Frederick Law Olmsted. Visitors will enjoy Boston's festivals and diverse neighborhoods, its public art, and the magic of global and regional culture colliding in the food. Learn what a vibrant, magnetic, inclusive place Boston is – the ideal location for an ISAKOS Congress!

The four-day ISAKOS Congress will include a myriad of educational opportunities. The meeting explores a variety of new and cutting-edge surgical techniques and approaches to clinical management, combined with overviews of current controversies in orthopaedic practice.

ISAKOS's international perspective is evident in our more than

350+
unique faculty members

REPRESENTING

47 **different** countries

AN ADDITIONAL

1,099
individuals
have been invited to present papers and e-posters, representing over

50+ **different** countries

The ISAKOS Congress will officially begin on Sunday, June 18. The Congress will be preceded by the beginning of the Sports Rehabilitation Concurrent Course on Saturday, June 17, running through June 19. This year's Sports Rehabilitation Concurrent Course features the *Sports Health* Symposium. We encourage you to consider attending the Concurrent Course and have included program details in this Newsletter on page 14.

The Congress will include a wide variety of topics and educational opportunities ranging from

36
Instructional Course Lectures

60
Symposia

11
Meet the Expert Sessions and

20+
Live and Video Surgical Demonstrations with leading surgeons from around the world

HIGHLIGHTS OF THE 2023 CONGRESS

In addition to rich and diverse educational programming,

Congress attendees will enjoy numerous networking opportunities including the **Women of ISAKOS Reception** on **Saturday, June 17th**

and the **Welcome Reception** on **Sunday, June 18th**

as well as awards and events recognizing excellence and **legendary contributions** to the field such as the presentation of the Inaugural **Freddie Fu** Lifetime Achievement Award and Freddie Fu Honor Lecture.

PAULA PARETO

PRESIDENTIAL GUEST SPEAKER

HOW THE "IMPOSSIBLE" BECOMES POSSIBLE

Sunday, June 18

09:35 - 10:00 am

In her first Olympic competition in Beijing 2008, Paula Pareto, MD, won the bronze medal and marked a milestone in the history of her sport and her country as the first Olympic medalist for the Argentinean judo. Undoubtedly the highest moment of her sports career was the Rio Olympics in 2016, when she made history by becoming the first Argentine woman to win a gold medal, and the only athlete of her country with two Olympic medals in individual sports. Most remarkably, between her travels, competitions, and training, Paula Pareto obtained the title of Medical Specialist in Orthopedics and Traumatology. She retired from competitions in 2021 in Tokyo, where she was chosen by the IOC to carry the Olympic flag representing the American continent in the opening ceremony, the first time that an Argentine athlete was granted this distinction. Today, Dr. Pareto divides her days between working in medical offices, the technical direction of the Argentine national judo team, and the medical staff of the Argentine Olympic Committee.

LIVE & VIDEO SURGICAL DEMONSTRATIONS*

A hallmark of every ISAKOS Congress, live and video cadaveric surgeries will be broadcast daily on a wide range of topics, featuring analysis and moderated discussion with leading surgeons.

- LET and ALL Reconstruction
- Repair of Massive Rotator Cuff Tears
- Bi-Cruciate Retaining TKR
- Managing Bone Loss in Shoulder Instability
- Complex Meniscal Repair
- Root Repair
- ACL Graft Harvest and Preparation
- Multiligament Knee Injuries Focusing on the Posterolateral Corner
- Glute Med Repair
- A New Approach to MCL Repair/ Reconstruction: The Short Isometric Construct
- Meniscal Substitution and Transplant
- Labral Repair
- FiberTak SpeedBridge with Lateral Knotless SLs + Subscapularis Knotless Repair
- ACL with IB +LET
- *rTSA with Augments + Biceps Tenodesis
- Meniscal Root with SutureLock and Ramp Lesions

*Surgical demonstrations confirmed as of February 13, 2022.

NEW! MEET THE EXPERTS

New for 2023, renowned leaders in the field share their unique perspectives and experiences on emerging issues in an engaging, small group roundtable format. Don't miss these special opportunities to meet and converse with an ISAKOS expert. Attendance is limited to maximize opportunities for interaction.

SUNDAY, JUNE 18

10:15 – 11:45 am

DIAGNOSING AND MANAGING HIP INSTABILITY

Chair: Olufemi R. Ayeni, MD, PhD, MSc, FRCSC CANADA
Matthew J. Brick, MBChB, FRACS NEW ZEALAND
Joshua D. Harris, MD UNITED STATES
Parth Lodhia, MD, FRCSC CANADA
Ajay Malviya, PhD, FRCS (T&O), MSc, MRCS Ed, MS (T&O), MBBS UNITED KINGDOM
Rodrigo M. Mardones, MD CHILE
Marcelo Queiroz, MD, MsC BRAZIL
Michael Lee Voight, DHSc, PT, FAPTA UNITED STATES

13:45 – 15:15 pm

ELBOW AND WRIST

Chair: Toshiyasu Nakamura, MD, PhD JAPAN
Chair: Luigi A. Pederzini, MD ITALY
Gregory I. Bain, PhD, MBBS, FRACS (Ortho), FAOrthoA AUSTRALIA
Deepak N. Bhatia, MS(Orth), DNB(Orth) INDIA
Andrea Celli, MD ITALY
Carina Cohen, PhD BRAZIL
Benjamin R. Graves, MD UNITED STATES
Christian Lozano, MD, MBA PERU
Luke S. Oh, MD UNITED STATES
Felix H. Savoie III, MD UNITED STATES

15:30 – 17:00 pm

KNEE LIGAMENTS

Chair: Thomas Michael DeBerardino, MD UNITED STATES
Chair: David H. Figueroa, MD CHILE
Karl F. Almqvist, MD, PhD UNITED ARAB EMIRATES
Diego Costa Astur, MD, PhD BRAZIL
Bancha Chernchujit, Prof. THAILAND
Peter A. Indelicato, MD UNITED STATES
Michaela Kopka, MD, FRCSC, Dip. Sports Med CANADA
Robert G. Marx, MD UNITED STATES
Mathieu Thaunat, MD FRANCE

MONDAY, JUNE 19

10:15 – 11:45 am

BIOLOGICS

Chair: Norimasa Nakamura, MD, PhD JAPAN
Francesca de Caro, MD, PhD ITALY
Laura de Girolamo, PhD ITALY
Montserrat Garcia Balletbo, MD, PhD SPAIN
Alberto Gobbi, MD ITALY
Elizaveta Kon, MD, Prof. ITALY
John G. Lane, MD UNITED STATES
Daniel Saris, MD, Prof. UNITED STATES
Martyn Snow, FRCS UNITED KINGDOM

13:45 – 15:15 pm

ACHILLES TENDINOPATHIES IN ATHLETES FROM PREVENTION TO MANAGEMENT

Chair: Gian Luigi Canata, MD ITALY
Chair: Jon Karlsson, MD, PhD, Prof. SWEDEN
Thomas Bauer, MD, PhD FRANCE
Michael Carmont, FRCS(Tr&Orth) UNITED KINGDOM
MaCalus V. Hogan, MD, MBA UNITED STATES
Umile Giuseppe Longo, MD, MSc, PhD, Prof. ITALY
Mihkel Mardna, MD ESTONIA
Yasunari Oniki, MD, PhD JAPAN
Yasuhito Tanaka, Prof. JAPAN
Pim Van Dijk, MD, PhD NETHERLANDS

15:30 – 17:00 pm

TKA

Chair: Myles R. J. Coolican, FRACS AUSTRALIA
Andrew James Price, DPhil, FRCS(Orth) UNITED KINGDOM
Michel P. Bonnin, MD, PhD FRANCE
David H. Figueroa, MD CHILE
Fares S. Haddad, MCh(Orth), BSc, FRCS(Orth) UNITED KINGDOM
Stephen M. Howell, MD UNITED STATES
Sebastien Lustig, MD, PhD FRANCE
William Maloney, MD UNITED STATES

Program and faculty subject to change. See isakos.com/2023 for latest information.

TUESDAY, JUNE 20

10:15 – 11:45 am

ARTICULAR CARTILAGE

Chair: Aaron J. Krych, MD UNITED STATES
Chair: David Sadigursky, MD, MSc BRAZIL
Nobuo Adachi, MD, PhD JAPAN
Ricardo Guillermo Denari, Prof. ARGENTINA
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Rene E. Verdonk, MD, PhD, Prof. em. BELGIUM

15:30 – 17:00 pm

SHOULDER INSTABILITY MANAGEMENT

Chair: Augustus D. Mazzocca, MD, MS UNITED STATES
Chair: Ivan Wong, MD, FRCSC, MACM, Dip. Sports Med CANADA
Robert A. Arciero, MD UNITED STATES
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Ettore Taverna, MD ITALY
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WEDNESDAY, JUNE 21

10:15 – 11:45 am

MANAGEMENT OF MASSIVE ROTATOR CUFF TEARS

Co-Chair: Augustus D. Mazzocca, MD, MS UNITED STATES
Co-Chair: Felix H. Savoie III, MD UNITED STATES
Simone Cerciello, MD ITALY
Bassem T. Elhassan, MD UNITED STATES
Vicente Gutierrez, MD CHILE
Teruhisa Mihata, MD, PhD JAPAN
Evan A. O'Donnell, MD UNITED STATES
Ivan Wong, MD, FRCSC, MACM, Dip. Sports Med CANADA

13:45 – 15:15 pm

HOW TO APPROACH THE OFF-TRACK GLENOID TRACK LESION?

Co-Chair: Emilio Calvo, MD, PhD, MBA SPAIN
Giovanni Di Giacomo, MD ITALY
Albert Lin, MD UNITED STATES
Paulo J. Llinas Hernandez, MD, Prof. COLOMBIA
Daichi Morikawa, MD, PhD JAPAN
Geoffroy Nourissat, MD, PhD FRANCE
Leo Pauzenberger, MD, PhD, MBA AUSTRIA

15:30 – 17:00 pm

TKA REVISION

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SPORTS REHABILITATION CONCURRENT COURSE

SATURDAY, JUNE 17—MONDAY, JUNE 19

ISAKOS is pleased to offer the sixth ISAKOS Sports Rehabilitation Concurrent Course featuring the *Sports Health* Symposium. The course is intended for physicians, athletic trainers, physiotherapists and coaches concerned with the management or prevention of injuries to the athlete. These topics will be viewed through the international perspective of a diverse and multinational faculty of orthopaedic surgeons and physical therapists.

**Add the Sports Rehabilitation Concurrent Course to your Congress Registration to participate. Additional fee applies.*

Co-Chairs: Lynn Snyder-Mackler, PT, ScD, FAPTA UNITED STATES
Yonatan Kaplan, PT, MSc(Med), PhD ISRAEL
George Davies, DPT, MED, PT, SCS, ATC UNITED STATES
Edward M. Wojtys, MD UNITED STATES

DAY ONE: JUNE 17
13:00 – 17:00 PM | ROOM 207

13:00 – 17:00	SESSION I: TRAINING THE ADOLESCENT ATHLETE
13:00 – 13:10	Introduction
13:10 – 13:30	Pubertal Growth Spurt: What Changes in Boys and Girls
13:30 – 13:50	Training Neuromuscular Control and Strength in Children
13:50 – 14:10	Training Considerations for the Skeletally Immature Athlete
14:10 – 14:30	Chronological Age vs. Biological Maturation
14:30 – 14:50	Strength Training for Adolescents
14:50 – 15:05	Panel Discussion
15:05 – 15:25	BREAK
15:25 – 15:45	The Role of Sleep in Health and Performance
15:45 – 16:05	Early Sport Specialization: What's the Problem?
16:05 – 16:25	Monitoring the Training Response in Adolescents
16:25 – 16:45	Injury Prevention Training
16:45 – 17:00	Panel Discussion

DAY TWO: JUNE 18
08:00 AM – 16:30 PM | ROOM 207

08:00 – 10:00	SESSION II: RETURN TO SPORTS (RTS)
08:00 – 08:15	Introduction
08:15 – 08:30	The Historical Battle: Criteria versus Time
08:30 – 08:45	Return to Sport after Shoulder Injury/Surgery – The Role of UE Functional Tests
08:45 – 09:00	The Psychological Barrier
09:00 – 09:15	Late Rehab and Return to Sport Testing – The Role of LE Functional Tests
09:15 - 09:30	The Role of Movement Testing in Second Injury Prevention
09:30 – 10:00	Return to Sport: Who Makes the Final Decision?
10:00 – 10:30	BREAK
10:30 – 11:45	**SESSION III: OLDER ADULTS IN SPORT**
10:30 – 10:45	The Golden Years: Joint Replacement and Sports Participation
10:45 – 11:00	OA and Exercise
11:00 – 11:15	Is There a Role for Arthroscopy in the Middle-Aged Athlete's Arthritic Knee?
11:15 – 11:30	Panel Discussion
11:45 – 12:15	VISIT THE EXHIBITS
12:15 – 13:15	LUNCH TIME SESSION: Continuum of Care on Unicompartmental OA – New Modalities - Part I
13:15 – 13:45	VISIT THE EXHIBITS

13:45 – 15:15	SESSION IV: INJURY PREVENTION
13:45 – 14:00	What the Last Decade has Taught Us
14:00 – 14:15	Update on AAOPT CPG on KIPP
14:15 – 14:30	Integrating Psychological Aspects in ACL Prevention and Rehabilitation – Where are We Holding Now?
14:30 – 14:45	How Long Do IPPS Last?
14:45 – 15:00	Injury Prevention in Children
15:00 – 15:15	Panel Discussion
15:15 – 16:30	**SESSION V: IMAGING IN SPORT INJURIES**
15:15 – 15:30	Should We be Using the Mounting Evidence from Imaging in ACL RTS Decision-making?
15:30 – 15:45	MRI and Hamstring Injuries: What have We Learned?
15:45 – 16:00	Imaging of the Shoulder - What Should We Look Out for in Rehabilitation?
16:00 – 16:15	What Radiology Can Teach Us in Sports Rehab
16:15 – 16:30	Panel Discussion

DAY THREE: JUNE 19
08:00 AM – 17:15 PM | ROOM 207

08:00 – 09:30	SESSION VI: KNEE ACL
08:00 – 08:15	Secondary Injury Prevention – ACL Rehab
08:15 – 08:30	Lessons from the STABILITY Trials – When is LET Necessary
08:30 – 08:45	Rehab – Does it Change by Graft?
08:45 – 09:00	On-field Rehab
09:00 – 09:30	Panel Discussion
09:30 – 09:45	BREAK
09:45 – 10:30	**SESSION VII: MENISCUS**
09:45 – 10:00	Save the Meniscus? When to Repair and When to Resect Meniscal Lesions: How Does it Influence RTS?
10:00 – 10:15	Rehab of the Meniscus Deficient Knee
10:15 – 10:30	Rehabilitation after Meniscal Surgery
10:30 – 11:00	**SESSION VIII: PATELLOFEMORAL**
10:30 – 10:45	Update on PF Surgery
10:45 – 11:00	Rehab After PF Instability Surgery
11:00 – 12:00	**SESSION IX: HIP AND SHOULDER**
11:00 – 11:15	Differentiating Groin Pain in the Athlete
11:15 – 11:30	The Myth of the Hip
11:30 – 11:45	Shoulder Injury Prevention, Rehabilitation, and Return to Sport for Athletes at All Participation Levels
11:45 – 12:00	Panel Discussion
12:00 – 12:30	VISIT THE EXHIBITS
12:30 – 13:30	LUNCH TIME SESSION: Continuum of Care on Unicompartmental OA – New Modalities - Part II
13:30 – 14:00	VISIT THE EXHIBITS
14:00 – 15:45	**SESSION X: MUSCLE, TENDON AND BONE INJURY**
14:00 – 14:15	Hamstring Injury Prevention in Elite Sports: Can it be Done?
14:15 – 14:30	Hamstring Injuries in the NFL
14:30 – 14:45	Examining Potential Risk Factors for Bone Stress Injury in Runners
14:45 – 15:00	Achilles Tendon and Exercise Load: Pain or No Pain
15:00 – 15:15	Biologics: Is there Evidence that the Players RTS Quicker?
15:15 – 15:45	Panel Discussion
15:45 – 16:45	**SESSION XI: MODALITIES IN REHAB**
15:45 – 16:00	Neuromuscular Electrical Stimulation in Rehab
16:00 – 16:15	Shock Wave Therapy in Orthopaedic Sports Medicine: Does it Really Work?
16:15 – 16:30	Biofeedback
16:30 – 16:45	Panel Discussion
16:45 – 17:15	**SESSION XII: WHAT'S NEW**
16:45 – 17:00	Innovations in Surgery BEAR Augmentation
17:00 – 17:15	Neuromuscular Training Innovations

Visit the Interactive Agenda for more details on the full Congress program.

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Ankle Syndesmosis Ligament Instability: Is There a Shift in Focus?

Nasef Mohamed N. Abdelatif, MD, PhD
OrthoClinic Medical Center
Cairo, EGYPT

Bruno Pereira, MD, PhD
FIFA Medical Centre of Excellence
Hospital Lusiadas - Braga
Hospital Santa Maria Maior
Barcelos, PORTUGAL

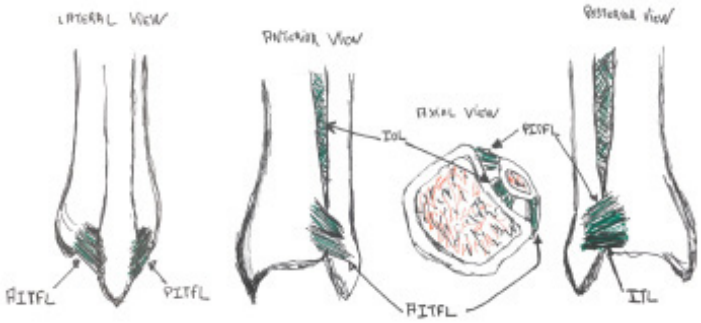
Introduction and Incidence

High ankle sprains are traumatic injuries resulting from sudden external rotation of the ankle that affects ligaments of the ankle, specifically, the syndesmotic ligaments. Traumatic ankle events occur extremely often, are considered one of the primary reasons for emergency department visits, and are frequently related to contact sports injuries. Ankle injuries involving damage to the syndesmotic ligaments typically result from a forced external rotation (abduction) of the foot on a dorsiflexed ankle, as is typically seen when a person is walking or running. Injuries to one or more of the syndesmotic ligaments constituting the distal tibiofibular syndesmosis are far less common than other ankle-related injuries. This type of ankle ligament injury accounts for <1% of ankle injuries without fractures and occurs in association with only 13% of all ankle fractures. However, injuries to these ligaments have been associated with high morbidity, including poor functional outcomes, instability, activity-associated pain and stiffness, and heterotopic ossification with lengthy recovery times[1].

Syndesmosis ligament injuries are frequently overlooked and represent a cause for persistent pain following ankle sprains. If injury to these ligaments is undetected during initial evaluation or if treatment is delayed, poorer outcomes are reported and can cause nearly 30% of patients to experience permanent complications.

Anatomical Considerations

As previously stated, isolated syndesmotic ligament injuries are relatively uncommon and typically present with injuries to other ankle ligaments, with approximately 5% of patients requiring surgery for the treatment of ankle instability. The syndesmosis is an essential stabilizer of the ankle joint and consists of a complex structure comprising four different segments: the interosseous ligament (IOL), the posterior inferior tibiofibular ligament (PITFL), the anterior inferior tibiofibular ligament (AITFL), and the transverse ligaments (PITFL and TL) (Fig. 1). The posterior portion of the syndesmosis plays the most important role by delivering 40%-45% of the resistance to diastasis, whereas the AITFL provides around 35%. Major injuries of two of the syndesmosis components represent a loss of >50% of resistance to diastasis and may result in acute ankle instability[2].

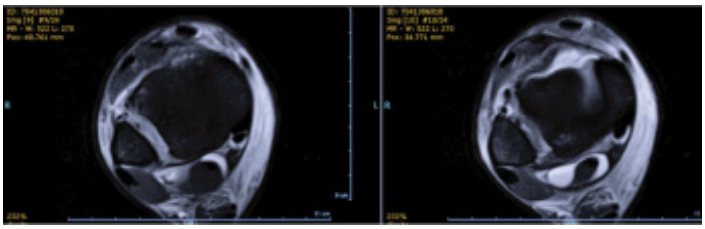


01 Schematic representation of the distal tibiofibular syndesmosis and its ligamentous anatomy from the lateral, anterior, posterior, and axial views.

Diagnostic Considerations

Syndesmotic ankle ligament-associated injuries can also include osteochondral defects (in 15% to 25% cases), peroneal tendon injuries (in up to 25% cases), fractures (including Weber B and C fractures), deltoid ligament injury, and loose bodies, increasing the chance of substantial delays in return to sports and return to activities. Recent studies have shown that misdiagnosis or delayed treatment of syndesmotic ligament injuries can result in end-stage ankle arthritis. It is imperative to note that syndesmotic injury does not necessarily equate with syndesmotic instability. Therefore, to achieve excellent functional outcomes, especially with nonoperative cases, it is essential to go beyond the conventional diagnostics of the external rotation stress test and plain radiographs, which may not indicate subtle injuries. To date, there is no single specific examination modality that can diagnose syndesmotic instability. Consequently, a high index of suspicion is mandatory. Physical examination remains critical, with relevant findings including tenderness over the anterior syndesmosis or a positive squeeze test at the mid-fibula.

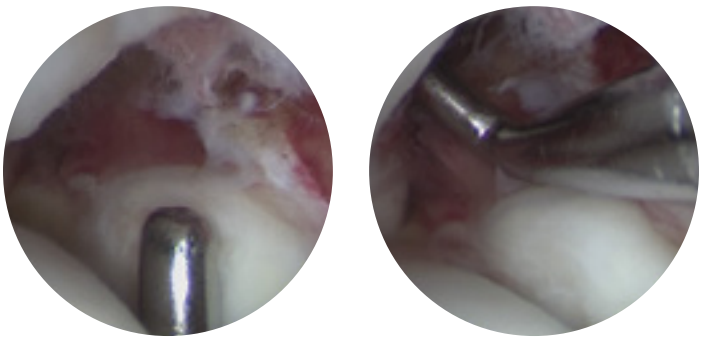
Imaging modalities that are useful for evaluating syndesmotic injuries include radiographs, ultrasonographic examination, computed tomography, and MRI scans. These modalities differ with regard to 3 primary characteristics, namely, their ability to (1) visualize the ankle joint under stress, (2) afford a contralateral comparison, and (3) evaluate the distal tibiofibular joint in 3 dimensions (3D). While plain radiographs might allow for rotational and stress testing, they remain limited as they are 2-dimensional (2D). MRI could show injury of ligaments, especially with 3-T imaging, yet the injury might not necessarily constitute an instability requiring intervention (Fig. 2). CT, especially if performed bilaterally with the patient bearing weight, has the additional advantage of showing normal physiological loading in 3D, and 3D volumetric comparison measurements have been shown to be of increased importance[3].



02 Axial MRI images showing syndesmotic injury.

Ultrasonography, although operator-dependent, is a safe, effective, dynamic, and relatively inexpensive diagnostic modality that can be applied bilaterally.

Recently, ankle arthroscopy has evolved to become a more reliable tool, especially for the diagnosis of subtle syndesmotic injuries. Although it is considered to be an invasive procedure that requires a high index of suspicion, it can be used to evaluate syndesmotic injury and, more importantly, to evaluate instability under stress. This dynamic assessment can be made in both the sagittal and coronal planes, yet rotational instability might be more difficult to assess and quantify (Fig. 3).

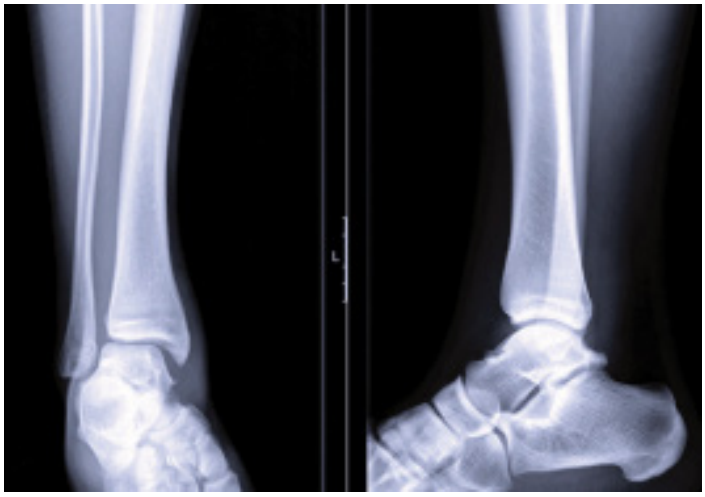


03 Arthroscopic images showing a syndesmotic injury associated with instability.

In the past couple of years, developments in needle arthroscopy have been rapidly progressing, such that this modality may help surgeons to better understand these and other ligamentous injuries, with the additional value of being utilized as an “in-office” procedure that can be performed with use of local anesthesia.

A final point worth mentioning is that the lateral collateral ligaments and the deltoid ligament both contribute to syndesmotic stability, yet injuries involving these structures are not often considered when discussing strategies for the treatment of syndesmotic instabilities[4].

Currently, there is no internationally recognized standard for classifying syndesmotic injuries. Most ankle injuries are first classified or distinguished according to the amount of time between the occurrence of the traumatic event and the presentation of symptoms or definitive diagnosis. In addition, injuries are graded according to the stability of the injury. A stable injury (Grade I) is described as an AITFL injury, with or without interosseous ligament (IOL) damage, and an intact deltoid ligament. An unstable injury (Grade III) is usually characterized by the additional presence of a deltoid ligament injury and is defined by the presence of latent or frank diastasis of the ankle mortise (Fig. 4). The classification and treatment of Grade-I and III injuries are straightforward. Research has indicated that stable injuries (Grade I) can be effectively treated with conservative measures, typically consisting of a period of non-weight-bearing, followed by a period of protected partial weight-bearing with a walking boot, and then physical rehabilitation. Conversely, unstable injuries (Grade III) (or injuries with associated fractures) should be surgically treated to prevent long-term disability and chronic ankle instability.



04 Radiographs showing evident (Grade-III) syndesmotic instability.

Ankle Syndesmosis Ligament Instability: Is There a Shift in Focus?

There is still discussion about the treatment decision on how to distinguish between a stable and an unstable syndesmotic injury, especially when diagnosing and treating Grade II injuries (considered subtle or latent unstable) and associated with an injury to the deltoid ligament[4].

Controversies

Although most of the controversies in the past decade surrounding syndesmotic injuries have centered mainly around management protocols and strategies, there has been a noticeable shift in the more recent literature toward diagnostic quantifications and reduction maneuvers. As such, there has been a considerable decline in previously debatable issues, such as the type of syndesmotic fixation (whether screws or flexible implants); the number of cortices targeted with screw fixation; the location, orientation, number, type, or size of the screws; and the ankle position during syndesmotic reduction. Conversely, other issues, such as diagnostic quantification, reduction methods, the degree of syndesmotic tightening, and ensuring fixation in proper anatomical positions, have been increasingly discussed more recently.

Generally, no compromise should be made on primarily reducing the bony configuration of the ankle joint—specifically, fibular length and rotation in patients with syndesmotic injuries that present with associated fractures.

In addition to putting more emphasis on reaching the correct diagnosis of syndesmotic instability, authors have also recently focused more on anatomical reduction methods rather than actual fixation types. Perhaps an obvious reason for the difficulty in the reduction of the syndesmosis is that, in addition to the natural anatomical variation that is characteristic of the syndesmotic joint itself, this joint does not just simply “reduce back” to its normal anatomically correct position.

In attempts to assess and quantify adequate reduction of the syndesmosis, several authors have described bilateral comparative measurement methods involving the use of intraoperative C-arm fluoroscopy or even CT scanning. It has been shown that the interobserver interclass correlation coefficient is poor when syndesmosis malreduction is assessed on weight-bearing CT scans, whereas bilateral 2D comparative techniques might show much better correlations[3]. This might be the reason why some authors have determined that intraoperative CT scanning might not necessarily reduce the incidence of malreduction[5].

Various strategies have been described to help in the accurate reduction of the syndesmosis. One option involves placing the medial tine of the reduction clamp on the anteromedial third of the distal part of the tibia, with the other tine placed on the posterolateral aspect of fibula and angulated at 15° relative to an absolute lateral of the talus. This option might be particularly relevant in closed subtle purely ligamentous instability.

As mentioned earlier, some authors have described the use of intraoperative comparative fluoroscopy imaging in the absolute lateral position to compare the fibular position relative to the posterior and anterior tibial cortex. Other authors have recommended open visualization of the anterior incisura and ensuring adequate reduction and an anatomical relationship between the anterior part of the fibula and the lip of the anterior incisura.

Management and Future Directions

The current surgical preferences vary between rigid fixation with use of screws (either permanent or temporary) and dynamic fixation with use of suture-button-like implants[4] (Fig. 5). More recently, some clinicians have adopted a procedure that involves the use of arthroscopy to stabilize the injured joint along with the use of the suture-button (either alone or in conjunction with screws). Screws allow for more solid temporary fixation in individuals who do not participate in contact or high-impact sports and provide a more flexible fixation after early removal. Athletes anticipating a return to playing could be managed selectively with either type of fixation. Several clinical studies have shown better movement and quality of life at 2 and 5 years for patients managed with the suture-button option, with less osteoarthritis, fewer complications, and reduced need for additional surgical procedures.

05 Postoperative Radiograph showing utilization of suture-button implant for management of syndesmotic instability.

Future directions might perhaps explore non-absorbable suture tape constructs or anatomical autograft or allograft ligament reconstructions. Perhaps this latter concept might be more applicable to chronic instabilities rather than the acute cases.

Conclusion

In conclusion, diagnosing syndesmotic injuries—and, more importantly, instability—requires a high index of clinical suspicion, coupled with additional comparative dynamic radiological investigations. Methods to refine the anatomical reduction of syndesmotic instability still require further investigation. It seems that more focus should, and is, being directed at the proper and correct evaluation of syndesmotic instability and how to restore the bony and ligamentous balance of the syndesmosis rather than debating the actual methods of fixation that might be utilized.

Works Cited

1. Bejarano-Pineda L, Guss D, Waryasz G, DiGiovanni CW, Kwon JY. The Syndesmosis, Part I: Anatomy, Injury Mechanism, Classification, and Diagnosis. Orthop Clin North Am. 2021 Oct;52(4):403-415. doi: 10.1016/j.ocl.2021.05.010. **2.** Rellensmann K, Behzadi C, Usseglio J, Vosseller JT, Böcker W, Polzer H, Baumbach SF. Acute, isolated and unstable syndesmotic injuries are frequently associated with intra-articular pathologies. Knee Surg Sports Traumatol Arthrosc. 2021 May;29(5):1516-1522. doi: 10.1007/s00167-020-06141-y. **3.** Abdelaziz ME, Hagemeijer N, Guss D, El-Hawary A, El-Mowafi H, DiGiovanni CW. Evaluation of syndesmosis reduction on CT scan. Foot Ankle Int 2019; 40(9):1087–1093. **4.** Regauer M, Mackay G, Nelson O, Böcker W, Ehrnthaller C. Evidence-Based Surgical Treatment Algorithm for Unstable Syndesmotic Injuries. J Clin Med. 2022;10;11(2):331. doi: 10.3390/jcm11020331. **5.** Davidovitch RI, Weil Y, Karia R, et al. Intraoperative syndesmotic reduction: three-dimensional versus standard fluoroscopic imaging. J Bone Joint Surg Am 2013;95(20):1838–1843.

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March – Volume I
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September – Volume II
Content must be received by **June 1**

Style Guidelines:

- 1,000–2,500 Words, and submitted in an editable format (Microsoft Word preferred)
- 3–5 Figures - Figures must be high resolution
- Maximum of 5 references
- Articles must include author information, including;
  - Full name, degree(s) and country
  - University or hospital affiliation
  - Color headshot for each author

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- **ISAKOS member authors:** The primary author must be an ISAKOS member. If there are multiple authors, at least one author must be an ISAKOS member, including the primary author.
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- Article inclusion in not guaranteed and is at the discretion of the Newsletter Editor and ISAKOS Office.

If you have any questions, please contact newsletter@isakos.com

Addressing Failed Surgical Reconstruction of the Medial Side of the Knee: A Case Illustration

Rajkumar S. Amaravathi, DNB, FRCS
St. Johns Medical College
Bangalore, Karnataka, INDIA

Rinju Krishnan, MS (Orth), DNB
St. Johns Medical College
Bangalore, Karnataka, INDIA

Rahul Shah, MS (Orth), D. Orth
St. Johns Medical College
Bangalore, Karnataka, INDIA

Sunil Lakshmipura Krishnamurthy, MS (Orth), DNB
St. Johns Medical College
Bangalore, Karnataka, INDIA

Abhey Wasdev, MS
St. Johns Medical College
Bangalore, Karnataka, INDIA

Jaya Vaishnavi Lal, MBBS
St. Johns Medical College
Bangalore, Karnataka, INDIA

Introduction

The medial collateral ligament (MCL) is the main static stabilizer of the medial side of the knee for valgus stress, rotational pressures, and anterior translational forces. The superficial medial collateral ligament (sMCL) has been reported to be the most commonly injured knee ligament, accounting for 42% of ligamentous knee injuries.[1,2] Most of these injuries can be treated conservatively with good clinical results. However, surgical reconstruction is required for the treatment of major instability, chronic injuries, multi-ligamentous injuries, or MCL avulsion on the femoral or tibial side.

Anatomically imprecise graft placement and suboptimal graft-fixation methods can lead to an over-constrained knee, residual instability, graft loosening, or implant failure, which can present challenges during subsequent corrective surgery.[2,3,4]

Anatomy and Biomechanics of the MCL

The medial side of the knee has three important structures: (1) the superficial medial collateral ligament (sMCL), (2) the deep medial collateral ligament (dMCL), and (3) the posterior oblique ligament (POL). The sMCL is the largest and strongest of the three, is rather flat, and has broad insertion sites on both femoral and tibial sides. The dMCL is an inverted fan-shaped structure passing from its small femoral attachment to a wide tibial attachment. Laprade et al[1,2] described the attachments of the sMCL, dMCL, and POL. The femoral attachment of the sMCL is 3.2 mm proximal and 4.8 mm posterior to the centre of the medial epicondyle. The two tibial attachments of the sMCL, proximal and distal, are approximately 12.2 mm and 61.2 mm distal to the joint line, respectively. The femoral attachment of the POL is 7.7 mm distal and 6.4 mm posterior to the adductor tubercle (AT) and is 1.4 mm distal and 2.9 mm anterior to the gastrocnemius tubercle (GT). The tibial attachment of the POL is just anterior to the direct arm of attachment of the semimembranosus tendon. Biomechanical studies have suggested that the sMCL is the major restraint to valgus motion at all angles and external tibial rotation, especially at 90° of knee flexion. The POL is an important restraint to internal tibial rotation and valgus rotation in full extension. Recent studies have highlighted the relevance of the dMCL in controlling external tibial rotation.

Presentation and Diagnosis

Injury to the MCL is due to excessive stress on the medial side of the knee, causing the fibers within the MCL to stretch out. Common reasons include valgus forces acting on the knee during sports activity or in road traffic accidents. Patients present with pain directly over the ligament, swelling, and inflammation over the medial part of the knee. In severe injuries, patients may feel the knee “give out” or buckle. Clinically, there is medial joint line tenderness along with tenderness over the MCL attachments. Valgus stress testing is done at 0° and 20° of knee flexion.

During the test, the medial-side opening of the knee is checked and classified into 3 grades based on severity according to the system of Hughston et al. The anterior rotatory drawer test is another diagnostic tool that helps in assessing posterior medial rotatory instability.

Management

Standard radiographs of the knee and valgus comparative stress radiographs at 0° and 20° of knee flexion are taken. At 20° of flexion, a difference of 3.2 mm indicates an isolated lesion of the sMCL and a difference of >9.8 mm indicates involvement of the whole posteromedial corner. MRI of the knee is an important tool in diagnosing MCL injuries. In patients with a chronic medial-side knee injury, it is advisable to obtain a standing scannogram of both lower limbs to check for any malalignment.

There is a broad consensus that the majority of isolated grade-I and II MCL injuries heal with rehabilitation alone. Most patients return to sports at 3 months, with excellent long-term patient-reported outcomes. Although grade-III injuries also may heal without surgery, some patients remain symptomatic following conservative treatment, necessitating reconstruction. Combined sMCL and POL injuries may be associated with an increased incidence of failure to respond to nonoperative treatment and may result in persistent MCL instability. Currently available surgical options include anatomic medial knee reconstruction (as described by Laprade et al.), the use of a single femoral tunnel combined with two tibial tunnels (as described by Lind et al.), repair of MCL avulsion with or without augmentation, MCL reconstruction with augmentation (fibre tapes/suture anchors), and MCL reconstruction with the flat tendon (as described by Abermann et al.[4]).

Why Does Reconstruction Fail?

Patient-Related Factors

Factors such as age, obesity (BMI >30), smoking, the activity status of the patient, generalized ligament laxity, and noncompliance with the rehabilitation protocol can contribute to the failure of surgical reconstruction. Early joint motion is crucial for maintaining mechanical properties and prevents the disorganization of collagen fibrils. The ability to initiate early postoperative mobilization allows for the return of knee function while minimizing the development of arthrofibrosis.

Diagnosis-Related Factors

Failure to diagnose posteromedial rotatory instability or failure to recognize the malalignment of the extremity may contribute to inadequate addressing of the problem and eventually may lead to failure.

Tunnel-Related Factors

Incorrect tunnel placement leads to a non-isometric tunnel, which will contribute to abnormal graft tensioning, leading to persistent laxity or overconstraint.

Graft-Related Factors

Soft-tissue grafts may stretch out over a period of time. Smaller-diameter soft-tissue grafts also may not give the desired results. It is difficult to reproduce the native flat-shaped MCL. Hence, the use of conventional tubular grafts probably would result in point-to-point fixation over a wide footprint and may lead to failure. Fixation of the graft with screw fixation or suspensory fixation is superior to the use of bone staples.

Tips and Tricks to Enhance the Outcome

Studies have suggested that using a flat tendon as a graft is advantageous as compared with conventional tubular grafts. Rerouting the graft along the native MCL would recreate the anatomy and would result in effective graft tensioning. Tendon stretch-out is a common problem with soft-tissue grafts; hence, augmenting the graft with fiber tapes or suture anchors in extra-articular procedures probably would help to maintain graft tension until ligamentization is achieved. The use of additional meniscocapsular sutures for graft augmentation is another technique. The aperture of the tunnels should be cleared of all soft tissue to enable easy passage of the graft. Secondary/accessory fixation can also be added to reinforce the construct. However, long-term follow-up is required.

Case Illustration

A 42-year-old morbidly obese female patient (BMI, 40.6) presented to the outpatient department because of difficulty with walking following an injury to the left knee that had been sustained in a road traffic accident 10 months previously. The patient had been diagnosed with a multi-ligamentous injury of the knee and had undergone reconstruction of the ACL, PCL, and medial side of the knee 1 month after the injury. Following the initial procedure, the patient was instructed to perform regular knee exercises and to walk after 2 months. At the time of presentation to our outpatient department, the patient still complained of instability in the left knee and the inability to walk. Physical examination of the left knee revealed tenderness over the medial joint line and femoral and tibial attachment of the MCL. The anterior drawer test, Lachman test, and posterior drawer test were negative. The valgus stress test was positive, with pain and medial opening when the test was performed with the knee both in complete extension and in 20° of flexion (Grade 3 on the Hughston scale).

A radiograph of the knee showed a previous ACL tunnel with an endobutton on the femoral side and bio-screw on the tibial side (Fig. 1). The PCL tunnel had bio-screws on both the femoral and tibial sides. The previous MCL graft was fixed with bone staples on both the femoral and tibial sides. Valgus stress radiographs made with the knee in 0° and 20° of flexion showed a medial-side opening of >10 mm. The patient was diagnosed with a failed MCL reconstruction and was scheduled for revision surgical reconstruction of the medial side of the knee.

Addressing Failed Surgical Reconstruction of the Medial Side of the Knee: A Case Illustration

01-A Pre-operative x-ray of the left knee – Bone staples over MCL attachments & previous tunnels for ACL and PCL.
01-B Valgus stress views showing >10 mm medial side opening.

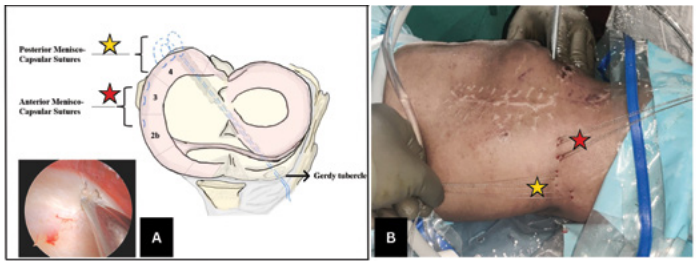
Surgical Technique

Positioning

The patient was positioned supine under anesthesia. A tourniquet was applied over the thigh. Knee range of motion between 0° to 120° was possible.

Arthroscopy

Diagnostic arthroscopy revealed vascularization of the previous ACL and PCL grafts. The medial femoral and tibial condyles showed Outerbridge Grade-1 cartilage changes. The medial compartment drive-through sign was seen. Both menisci were found to be intact. Six inside-out menisco-capsular sutures (three in Smigielski[5] Zone 4 of the medial meniscus [posterior] and three in Smigielski[5] Zones 2b and 3 of the medial meniscus [anterior]) were inserted with use of no. 2-0 fibre-wire (Sironix; Healthium, Peenya, Bangalore, India) for the planned augmentation of the grafts (Fig. 2).



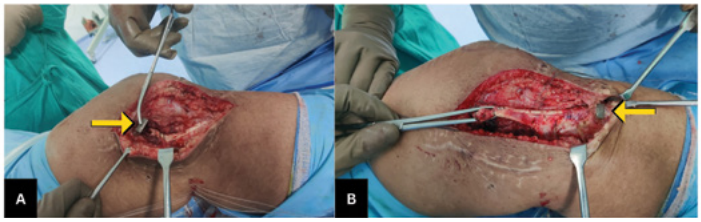
02-A Inside-out Menisco-capsular sutures taken in zones 2b, 3 & 4.
02-B Inside-out Menisco-capsular sutures – anterior (★) and posterior sutures (★).

Medial-Side Exposure

On the medial side, an incision (approximately 10 cm long) was made. The soft tissue was dissected, and the previous MCL graft was exposed and was found to be lax.

The femoral-side bone staple was loose, and the femoral tunnel was found to be non-anatomical (Fig. 3-A). On the tibial side, the bone staple was holding the graft, which had become vascularized (Fig. 3-B). Hence, the tibial side was left undisturbed. The femoral bone staple was then removed and the previous lax graft was reflected to the tibial side.

We decided to revise the medial side reconstruction with a single femoral tunnel and two tibial tunnels (one each for the sMCL and the POL) along with augmentation of the grafts with menisco-capsular sutures.



03-A Previous lax ligament along with loose bone staple on the femoral side.
03-B Previous tibial side bone staple along with ligamentized graft.

Graft Preparation

A minimum graft length of at least 22 to 26 cm is required for the reconstruction of the sMCL. As the hamstrings on the ipsilateral side were already used during the primary surgery, semitendinosus and gracillis grafts were harvested from the contralateral leg. The length of the semitendinosus and gracillis grafts were 28 and 24 cm, respectively. Grafts were clubbed together to make one limb for the femoral tunnel and two limbs for the tibial tunnels. Grafts were augmented with use of fibre tapes (Sironix; Healthium, Peenya, Bangalore, India).

First, both the semitendinosus and gracillis grafts were sutured side-to-side at both ends. The graft was folded onto itself to make a shorter limb and a longer limb comprising one-third and two-thirds of the graft length, respectively. A 25-mm looped end of the graft was prepared with use of a Krackow stitch with no. 2 non-absorbable fibre-wire (Sironix; Healthium, Peenya, Bangalore, India) for the graft placement in the femoral tunnel. Similarly, a shorter limb of the graft, which was to be used for POL reconstruction, was prepared, and a length of 25 mm was marked from the end to serve as a guide for the length of the graft to be inside the POL tibial tunnel. In the same fashion, a longer limb of the graft was prepared, and a length of 25 mm was marked to be used for the tibial side of the sMCL.

Tunnel Preparation

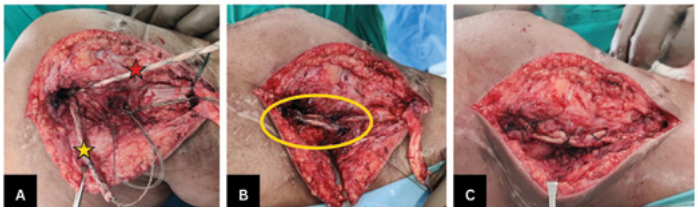
Femoral tunnel. A 2.4-mm guide-pin was placed over the anatomical location of the sMCL femoral attachment (3.2 mm proximal and 4.8 mm posterior to the medial epicondyle as per Laprade et al.). The location was confirmed with fluoroscopy. The guide-pin was advanced and, with use of the appropriately sized reamer, a femoral socket measuring 7 x 25 mm was prepared.

Tibial sMCL tunnel. A 2.4-mm guide pin was placed over the anatomical location of the sMCL tibial tunnel (61.2 mm distal to the joint line as per Laprade et al.). The guide-pin was advanced and, with use of a 6-mm reamer, a tibial socket measuring 6 x 25 mm was prepared. The tibial bone staple along with the previously attached graft was left undisturbed.

Tibial POL tunnel. A 2.4-mm guide pin was placed over the anatomical location of POL (anterior to semimembranosus as per Laprade et al.), and the guide-pin was advanced and directed towards Gerdy's tubercle. With use of a 6-mm reamer, tibial socket measuring 6 x 25 mm was prepared.

Graft Insertion

The sutures of the graft were shuttled into the previously drilled tunnels, with the looped end shuttled into the femoral tunnel (Fig. 4-A). The femoral side was secured with an 8 x 25-mm bioscrew (Sironix; Healthium, Peenya, Bangalore, India). The POL (shorter limb) side of the graft along with 3 posterior menisco-capsular sutures was shuttled into the POL tibial tunnel and was secured with a 7 x 25-mm bio-screw with the knee in full extension. The sMCL (longer limb) side of the graft was passed into the tibial tunnel for the sMCL and was secured with a 7 x 25-mm bio-screw with the knee in 20° of flexion. The three anterior menisco-capsular sutures were then sutured over the sMCL graft (Fig. 4-B). The previous graft was also then sutured over to the newly reconstructed MCL, and thus augmentation of the new graft was achieved (Fig. 4-C). Accessory fixation was achieved by tying the free ends of fibre-wires of both limbs of the graft (sMCL and POL) over the anteromedial aspect of the tibia.



04-A Graft with looped end fixed inside the femoral tunnel. Short link (★) for POL along with posterior meniscocapsular sutures. Long limb (★) for sMCL. Also note augmentation of the graft with fibre tapes.
04-B Suturing anterior menisco-capsular sutures over the reconstructed sMCL.
04-C Previous graft augmented over the newly reconstructed ligament.

Postoperative Protocol and Rehabilitation

The patient was allowed up to 30° of knee flexion for the first 3 weeks and up to 60° for the next 3 weeks and was managed with non-weight-bearing mobilization for the first 6 weeks. From 6 to 9 weeks, the patient was allowed knee flexion up to 90°, along with partial weight-bearing mobilization with the knee locked in complete extension. At the time of the latest follow-up at 3 months, the patient was walking with full weight-bearing.

Knee flexion of up to 110° was achieved, with no extension lag, and valgus stress radiographs of the left knee showed no significant medial-side opening (Fig. 5).

05 Post-operative radiographs of the left knee at 3 months follow up.
05-A AP view in full extension.
05-B AP view with valgus stress in full extension.
05-C AP view with valgus stress in 20 degrees of flexion.
05-D Lateral view.

Summary

Reconstruction of the medial side of the knee is a challenging situation. There can be catastrophic anatomical consequences if the underlying problem is not properly diagnosed and treated. Failure of the primary procedure can cause substantial distress that can affect activities of daily living. From a surgeon's point of view, revision of a failed MCL reconstruction presents a plethora of challenges, warranting thorough planning of the procedure. Surgical intervention should be done to recreate the anatomic reconstruction of the medial side of the knee by addressing the sMCL and POL. The addition of menisco-capsular sutures to the grafts for reconstruction of the sMCL and POL can help to augment the surgical construct. The end result should be accomplished by achieving a stable knee with the resolution of laxity and instability throughout the range of motion.

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Osteo-Core-Plasty: Minimally Invasive Approach for Subchondral Pathologies in Knee Osteoarthritis

Dawid Szwedowski, MD, PhD
O.A.S.I Bioresearch Foundation NPO
Milan, ITALY

Katarzyna Herman, MD
Brothers Hospitallers Hospital in Katowice
Jaworzno, POLAND

Leandra Bizzoco
O.A.S.I Bioresearch Foundation NPO
Milan, ITALY

Anna Montagna, PhD
O.A.S.I Bioresearch Foundation NPO
Milan, ITALY

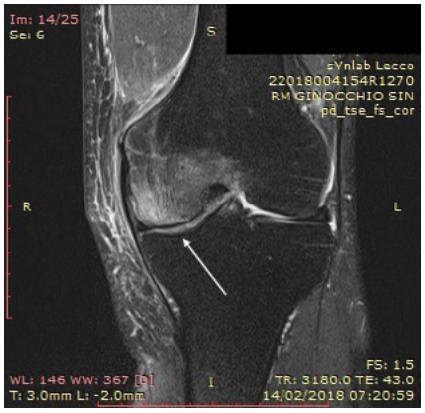
Introduction

Subchondral bone is responsible for cartilage nutrition and plays an important role in the healing of chondral lesions. There are two major parts of subchondral bone: the bone plate and the spongiosa. Subchondral bone remains an underappreciated element of joint health and should be viewed as a critical part of the osteochondral unit. In patients with knee osteoarthritis, subchondral bone marrow edema (BME) correlates with faster joint degeneration and more pain. Although there are limited treatment options involving the subchondral bone, a great deal of research is being conducted on the use of biologics to maintain and improve cartilage health[1,2]. A relatively new, minimally invasive procedure for treating subchondral pathologies in order to prevent the development of osteoarthritis is Osteo-Core-Plasty (OCP). Typically, osteoarthritis-related subchondral cysts and painful BME are the indications.

The OCP procedure involves the utilization and implementation of the Marrow Cellution Bone Marrow Collection and Autologous Bone Core Harvesting System to collect and percutaneously inject highly specialized bone marrow and intact vascularized bone core cylinders into the region of BME to repopulate the intertrabecular space, thereby improving bone remodeling.

Diagnosis

Bone marrow (BM) lesions can be detected with magnetic resonance imaging (MRI), which is an essential diagnostic tool. Additionally, MRI is widely used as the gold standard for the evaluation of the morphologic status of cartilage. Typically, BME appears as hyperintense areas within the trabecular subchondral bone at the site of increased mechanical stress on fat-saturated T2-weighted and short tau inversion recovery (STIR) sequences (Fig. 1). After acute trauma, clinicians can expect to see BME. There are heterogeneous patterns of subchondral signal changes in such cases, with poorly defined lesions. In the setting of knee osteoarthritis (OA), BME can only be recognized after more aggressive and irreversible diseases with similar clinical symptoms have been excluded. Stress fractures; complex regional pain syndrome (Sudeck syndrome); primary bone tumors; femoral metastases; infectious, reactive, or rheumatoid arthritis; osteomyelitis; and osteonecrosis are among the differential diagnoses. It can be helpful to evaluate the derivations of BME on the basis of the patient's history and physical symptoms.



01 BME in the medial femoral condyle is indicated by the hyperintense region in this T2-weighted MRI scan.

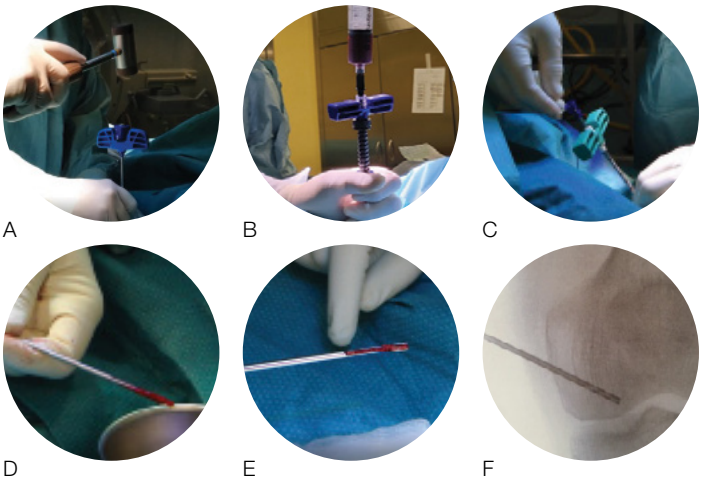
Surgical Technique

The Marrow Cellution Osteo-Core-Plasty surgical technique was conceived as a biological approach for treating subchondral lesions with autologous BM cells and intact bone cores as opposed to with a standard scaffold such as injectable cement. Developed in collaboration with Aspire Medical Innovation GmbH and by Alberto Gobbi, OCP has been used for a few years with exceptionally good clinical outcomes[3-5].

The procedure is initiated by aspiration of the BM from the ipsilateral iliac crest with use of a sharp trocar with a hollow aspiration sleeve (Fig. 2-A). The introducer needle with a sharp stylet is placed in the cancellous bone between the cortices. When 1 mL of bone marrow has been aspirated to ensure proper positioning of the needle tip, the sharp stylet is replaced with a blunt one. From a single stick, the Marrow Cellution system is capable of collecting up to 10 mL of high-quality bone marrow (Fig. 2-B). Additionally, a sharp trocar is used to harvest some bone dowels (Figs. 2-C, 2-D, and 2-E).

The patient, under regional or spinal anesthesia, is placed in the supine position for standard knee arthroscopy. Before the Marrow Cellution injection proceeds, any concomitant abnormalities such as chondral lesions, meniscal tears, and ligament lesions should be addressed and treated. Limb alignment plays a crucial role in cartilage lesion treatment; therefore, any abnormalities should be treated as well[3].

To ensure placement of the guide-pin exactly in the BME, anteroposterior and lateral fluoroscopic images are cross-referenced with the MRI study (Fig. 2-F). After the guide pin is placed, the Marrow Cellution cannula is placed over it, and then the pin can be removed. The implantation of Marrow Cellution suspension is then injected into the targeted region through the Marrow Cellution cannula. The Marrow Cellution trocar is left in place for 5 to 7 minutes in order to allow the material to disperse within the BME lesion and to form a clot. A final arthroscopic examination is performed to ensure that there are no leaks within the joint[3]. If surgically required, autologous bone dowels can be harvested with the Marrow Cellution harvesting and extraction of a trocar and then implanted into the subchondral lesion.



02-A Advancing the trocar in the ipsilateral iliac crest.
02-B Aspiration of the bone marrow from the iliac crest.
02-C-E Harvesting of bone dowels.
02-F Intraoperative fluoroscopic image showing placement of cannula in the medial femoral condyle.

Postoperative Protocol

The postoperative protocol must be adjusted according to the concomitant procedures conducted during surgery. The most important aspects of early postoperative rehabilitation are pain control, maintaining the range of motion, and preventing muscle atrophy.

Touch-down weight-bearing is allowed at 3 to 4 weeks postoperatively, and full weight-bearing is achieved at approximately 6 weeks. Immediately after the procedure, continuous passive motion and a cryo-cuff are applied to lessen the pain and swelling and to maintain the joint fluid motion. On the second day after the procedure, isometric and isotonic exercises are introduced. After the wounds are healed, pool exercises can be initiated to help the patient to regain a normal gait pattern.

Follow-up MRI is performed at the end of 3 months and 6 months following the procedure. A decrease in hyperintense signal on T2-weighted images can be appreciated at 3 months (Fig. 3). However, complete resolution of the lesion can be expected at the end of 6 months.

03 T2-weighted MRI scan, made at 3 months following the procedure, showing the reduction in the hyperintense signal.

Discussion

The subchondral bone plays an important role in natural cartilage healing. Certain diseases of the cartilage are diseases of the osteochondral unit rather than the cartilage alone. Imhoff et al. showed the presence of arteriovenous complexes penetrating the subchondral bone plate and reaching into the calcified cartilage[2].

Consequently, it obtains a blood supply layer up to the tidemark. Overloading of the degenerated joint will impede the flow of nutrients from the subchondral bone to the cartilage and thus disturb natural healing. Although the mechanisms are still debated, pain may be a result of impaired venous drainage as a response to repetitive microtrauma. In addition, several studies have correlated outcomes with known subchondral BME before cartilage-restoration procedures. Additionally, the persistence of edema-like signs in the subchondral bone is a predictor of poor clinical outcomes after microfracture surgery.

Osteo-Core-Plasty: Minimally Invasive Approach for Subchondral Pathologies in Knee Osteoarthritis

Biological adjuncts to cartilage injuries are becoming increasingly researched and may prove to be beneficial in addressing common concerns. Autologous bone marrow and intact bone cores represent an easily accessible and available source of mesenchymal stem cells (MSCs) and growth factors, including platelet-derived growth factor (PDGF), transforming growth factor-beta (TGF-β), and bone morphogenetic proteins (BMP-2, BMP-7), which have anabolic and anti-inflammatory effects. Although bone marrow aspirate concentrate (BMAC) is one of the most attractive sources of MSCs, several aspects (such as the amount of aspirate required) need further exploration.

OCP is a new minimally invasive procedure with reported efficacy for the treatment of painful BME associated with knee osteoarthritis. It may be particularly important for younger, active patients who wish to reduce pain and avoid or delay total knee arthroplasty.

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Reverse Total Shoulder Arthroplasty

Francesco Franceschi, MD
UniCamillus-Saint Camillus International University of Health Sciences
San Pietro Fatebenefratelli Hospital
Rome, ITALY

Edoardo Cristalli, MD
Sant'Andrea Hospital
La Sapienza, Rome, ITALY

Introduction

Reverse total shoulder arthroplasty (RTSA) is known to be a functional rather than an anatomical surgical procedure. In fact, it overthrows the normal glenohumeral anatomy by transferring the convex component to the glenoid side and the concave component to the humeral side. The goal is to allow good shoulder function even in the absence of a functional rotator cuff.

RTSA is based on four cardinal principles: (1) the center of rotation must be fixed, distalized, and medialized at the glenoid surface; (2) the deltoid lever arm must be effective from the onset of movement; (3) the prosthesis must be inherently stable; and (4) the construct must create a semiconstrained joint.

The indication for which RTSA was initially developed was cuff tear arthropathy in the elderly, for whom there was a lack of viable surgical treatments for irreparable massive injuries. The indications have expanded over time, and RTSA is now also widely used for the treatment of nonsynthesizable fractures of the proximal part of the humerus[1] as well as massive rotator cuff tears, even those that are not associated with arthropathy.

The design of RTSA implants is constantly evolving, with the goal of minimizing complications and improving range of motion (ROM). Such evolutions have included the development of configurations with medialized or lateralized glenospheres, humeral inlay and onlay components, and neck-shaft angle modifications. The results of these configurations and possible couplings, along with their advantages and disadvantages in each case, were studied in order to find the best compromise of stability and articularity.

Glenosphere Positioning

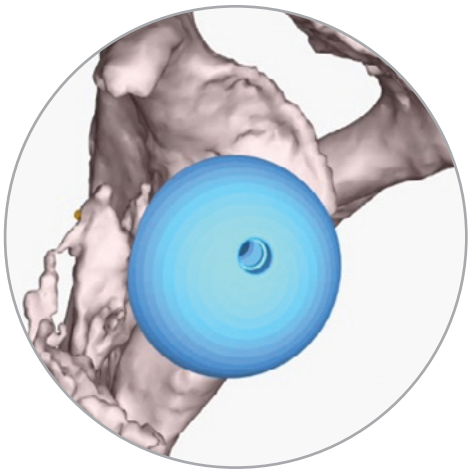
The initial design of the RTSA included a medialized glenosphere (Figure 1) so that the center of rotation was medialized as much as possible. Studies in later years have shown the limitations of this positioning with regard to notching and tensioning of the residual rotator cuff. In actuality, if a medialized glenosphere is combined with an inlay humeral configuration, the residual rotator cuff can become detensioned, resulting in worsened ROM in internal and external rotation and less deltoid wrapping, reducing the horizontal stabilizing force and potentially increasing the risk of dislocation.

Therefore, several techniques have been developed over the years to lateralize the glenosphere in order to achieve greater tensioning of the infraspinatus and teres minor, thereby improving the capacity for internal and external rotation. Other advantages associated with this configuration include a reduced incidence of scapular and humeral impingement and a greater ability of the deltoid to horizontally stabilize the implant, reducing the risk of dislocation.

Lateralization can be achieved with different techniques and components. A bone augment, usually taken from the head of the humerus before osteotomy, can be implanted on the glenoid along with the baseplate. This is also very useful to compensate for any bony defects in the glenoid. This technique, known as bony increased offset reverse shoulder arthroplasty (BIO-RSA), maintains the center of rotation inside the bone. Lateralization of the glenoid component can be achieved with use of metal augments and eccentric lateralizing glenospheres.

Inferior eccentricity is another parameter that can contribute to the improvement of ROM while reducing inferior scapular notching.

Today, harnessing the different techniques, most prosthetic implants are implanted with a lateralized and inferiorly eccentric glenosphere.



01 Glenosphere in its position on the glenoid.

BIO-RSA and Angled BIO-RSA

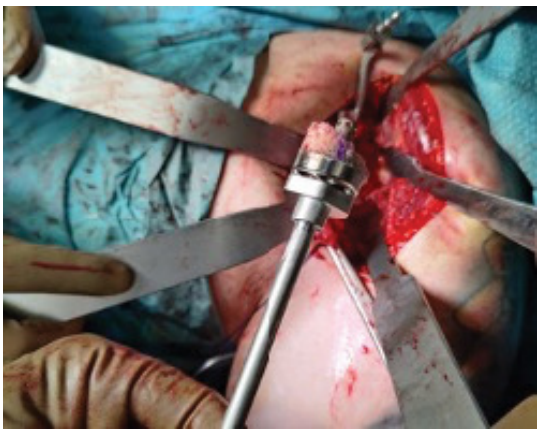
The topic of BIO-RSA (mentioned above) deserves further investigation as it is a very peculiar technique. In several cases, the glenoid has bone deficits that should be corrected in order to maximize baseplate fixation and overall function of the prosthesis. Walch type-A2, B2 and C and Favard type-E2 and E3 glenoid often are treated with asymmetric reaming and sometimes with an augment. In the past, the only chance to correct the bone defect was through autologous iliac crest harvesting, a very invasive technique, or through metal-augmented baseplates.

Recently, a new and innovative technique to obtain an autologous graft while minimizing invasiveness for the patient has gained ground. This technique involves harvesting an autologous graft from the head of the humerus (Figure 2); the graft can be symmetrical or asymmetrical, depending on the bone defect and angle to be corrected. Boileau et al. evaluated a technique termed angled BIO-RSA, which involves the use of a nonsymmetrical graft that allows filling of the bony defect in the glenoid while restoring the proper angle, allowing for less notching, improved deltoid wrapping, and an overall more efficient prosthesis[2].

Angled BIO-RSA allows for the correction of multiplanar defects, such as major version and tilt deformities, that cannot be corrected by asymmetric glenoid reaming. In the case of particularly large defects that exceed 25% of inclination or retroversion, CT planning with three-dimensional (3D) reconstructions may also be used to assess the size and shape of the graft to be harvested.

Baseplate fixation with graft addition requires a rather long central peg as well as appropriate screws. Postoperative CT scanning can be used to assess the integration of the graft, the presence of notching, and the effective correction of the bone defect.

In conclusion, according to Boileau et al. and our experience, the humeral graft provided optimal integration and correction of the deformity, allowing patients to achieve results comparable to those with a defect-free glenoid.



02 Autologous graft taken from the humerus, shaped and implanted on the baseplate.

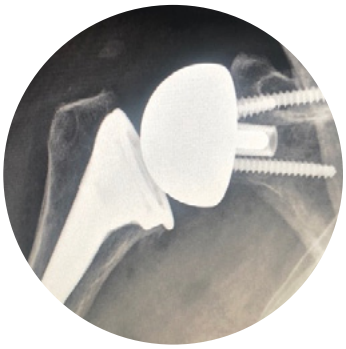
Humeral Stem Design

Inlay vs. Onlay

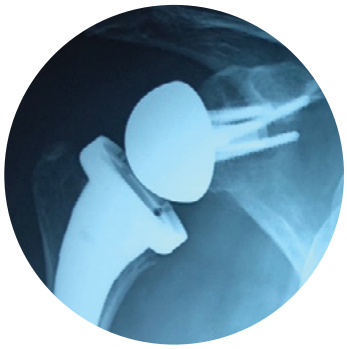
The main stem configurations involve either an inlay (Figure 3) or onlay (Figure 4) design. With an inlay design, reaming of the proximal part of the humerus is performed and the humeral tray is seated within the metaphysis, eroding the bone stock and the tuberosities. With an onlay design, the humeral tray lies on the osteotomy of the proximal part of the humerus, achieving lateralization of the humerus while preserving the bone stock. Lateralization on the humeral side increases the lever arm, improves the deltoid wrapping and decreases the incidence of notching, maintaining the center of rotation inside the bone.

Opting for a humeral inlay component reduces residual rotator cuff tension and deltoid tension, affecting internal and external rotation. Conversely, the onlay configuration leads to more tension in the cuff and deltoid, providing better ROM.

Larose et al. performed a meta-analysis to evaluate the differences and outcomes of the two designs, including movement in all planes of motion and the incidence of complications[3]. This analysis involved 12 studies evaluating the outcomes of the two different configurations with use of the American Shoulder and Elbow Surgeons (ASES) score, ROM, complications, and postoperative benefits. Both groups of patients showed significant improvement in terms of symptoms and range of motion. The inlay design proved superior in terms of the ASES score. Although the onlay configuration was statistically superior in terms of ROM, this difference was not clinically important. The onlay design demonstrated a lower incidence of notching but a higher incidence of scapular spine fractures.



03 Inlay stem



04 Onlay stem

Short Stem vs. Long Stem

The length of the humeral stem is an important factor for multiple reasons. Proper stem sizing provides stable integration or cementation and optimal load and force distribution. Stem length also affects the preservation of bone stock. Optimal placement is also important to maximize the achievable ROM.

Reverse Total Shoulder Arthroplasty

Erickson et al. evaluated a long stem and a newer short stem configuration[4]. Both stems allow for the use of a modular cup and either a 155° or 135° humeral inclination angle. The study was performed with use of the 135° cup. After a minimum follow-up of two years, they evaluated both component integration and clinical outcomes. The short stem was associated with superior clinical results, excellent integration characteristics, less sacrifice of bone stock, and slightly better outcomes in terms of rehabilitation and ROM. In addition, this component is less problematic in case of an eventual revision surgery.

Neck-Shaft Angle

Another important humeral parameter is the neck-shaft angle (NSA), which is calculated by measuring the direct angle between the normal vector of the anatomic humeral head osteotomy plane and the humeral canal axis. The original Grammont design, which remained in use for many years, had a 155° NSA. Subsequently, in addition to the already discussed changes in humeral stem shape and positioning, the NSA was also modified in an effort to offer increasingly high-performance prostheses with better ROM.

Arenas-Miquelez et al. analyzed changes in ROM in the different planes with different stem and NSA configurations[5]. Changes were found to be clinically important and statistically significant. Inlay, semi-inlay, and onlay stems were used for the trial. In the case of semi-inlay stems, increasing the NSA angle produced an increase in abduction.

In contrast, as NSA angle increased, adduction decreased consensually. On the other hand, when analyzing the ROM meant as the sum of abduction and adduction, the result was shown to be similar for each NSA angle. Flexion, extension and combined ROM were found to be superimposable for all three NSA angles considered. Tests of internal and external rotation, performed with the arm at 10° of abduction, demonstrated different results depending on the configuration, with a progressive increase in both values and thus in overall ROM from 155° to 145° and finally to 135°.

Conclusions

There continues to be great fervor in trying different designs, placements, and configurations in order to achieve increasingly satisfactory results. As previously stated, the ideal design of the reverse prosthesis is still the subject of study and discussion. There is now unanimous agreement that lateralization of the glenosphere and thus the center of rotation has advantages, whereas humeral design variations are the subject of continued work and debate.

For some features, there is still no unanimous consensus, but great advances have been made in improving overall ROM, reducing notching, and reducing adverse events such as acromial and scapular spine fractures. Certainly, the lateralized position of the glenosphere and its inferior eccentricity have made great contributions to improving ROM, and these concepts now have a solid background in the current literature. Currently, regarding the other configurations, the choice of the best compromise for the individual patient is left to the surgeon.

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Virtual Training and the Reality of Taking a Break as a Surgeon

Alessandra Amy Elizabeth Ross, MD
Remedy Medical Group,
OSSO VR
Bordeaux, FRANCE

Skill decay is a reality for surgeons, especially post-pandemic. Can virtual reality bridge the gap?

In the spring of 2011, I was called to leave my comfortable position as a community orthopaedic surgeon at Fort Jackson, South Carolina, USA, to serve in a forward NATO base outside Herat, Afghanistan. Although resonant of my wartime residency training at Walter Reed Army Medical Center, the clinical situations that I encountered were vastly different from the sports injuries that I had treated and the arthroscopic procedures that I performed on soldiers and their families.

In Herat, our operating rooms were protected metal structures. Typical injuries included gunshot and blast wounds, burns, and snake bites. Our surgical team consisted of care providers from three different countries. Together, we worked in unfamiliar, hostile conditions and with limited resources. We were forced to find creative solutions in order to provide our patients with the best possible outcomes. Our care was grounded in basic-science principles. Overall, we succeeded in providing good care in daunting circumstances.

A year after leaving Fort Jackson, I returned from deployment feeling anxious about re-entering professional life at my home base. My patients and community expected me to pick up where I left off, leveraging the surgical skills that I had cultivated in residency.

It had been a year since I had picked up an arthroscope, and a nagging voice inside my head asked, “Who will be the first patient? What if I need more practice?”. I felt sick. I was responsible for regaining my hands, my confidence, and the cohesion of my surgical team to offer our patients quality care and positive outcomes.

My challenge at the time seemed unique. How do I practice my skills outside of the operating room? Where do I go? What resources are available? The answers, it seemed, were not so easy to find—yet I was far from the only surgeon searching for them.

The reality is that a surgeon’s career can be interrupted or derailed at any time. Some leave the profession to raise children, to care for a sick or ailing family member, or to recover from an illness.

However, nothing brought this issue to light more clearly than the COVID-19 pandemic. As the pandemic gripped our world, clinicians and the systems in which we work faced unprecedented circumstances. As a community, we experienced not only the devastation of lives lost but the crippling uncertainty of how to continue to provide safe care to our patients in hospitals and clinics.

The pandemic highlighted both strengths and weaknesses in our medical systems. Some aspects of providing care were swiftly augmented with the adoption of telemedicine. Other aspects, such as performing technical procedures, remained possible only in person and within the established health care systems in which we had operated previously. Surgeons who had stepped away from the OR to wait for the resumption of elective procedures found themselves in the same holding pattern that I was experiencing.

My learning journey back into practice was an alignment of opportunities offered by partners, regional equipment reps, and the local university hospital, whose staff allowed me to shadow them and refresh my skills under their guidance. I participated in a local mobile cadaver lab, traveled to weekend cadaver lab courses, and practiced on a sawbones model with tools to regain muscle memory for the procedures that I routinely performed. Under the advice of an academic mentor, I even practiced arthroscopic triangulation on a piece of cabbage in a bowl of water. I could not have been more grateful for all of the time, resources, and patience that my partners and colleagues supplied to me.

It became clear that my journey to refresh my skills post-deployment was expensive in terms of time and resources. I knew that I had been gifted with a once-in-a-lifetime opportunity to confidently reclaim my professional career—an opportunity that not all surgeons have after a hiatus.

After I returned to practice, I became more sensitive to the plethora of reasons why a medical provider might desire additional training. While some situations were outliers, such as life events or the pandemic, others were common challenges that every surgeon faces in their practice, including the need to master evolving techniques, devices, and technology. I was curious how the education process could be made more efficient, realistic, and accessible. How amazing would it be to quickly learn a new skill or refresh an old one with ease?

Years later, a constellation of events led me to an unexpected but welcome (and necessary) answer. My work had taken me near Silicon Valley, and I had the opportunity to meet CEOs from various startups using different technologies in medical care and education. Then the pandemic hit. It demanded the world’s attention, and my elective sports medical practice abruptly stopped. My time with patients became remote and nonsurgical. I found myself again on a professional hiatus.

This time, however, instead of worrying about how I would resume, I recalled having been introduced to a technology that could tackle the challenge of access to training head-on: virtual reality (VR). VR is a tool that addresses training and assessment on demand, remotely, and collaboratively.

The capabilities and power of VR can be hard to visualize, particularly for those who are unfamiliar with this technology. Briefly, a user transports into an immersive virtual environment via a headset and uses controllers to manipulate a realistic world around them. For some, this may sound fantastical. Yet, anyone who travels has likely appreciated that pilots have first learned to fly on simulators. We trust the airline industry to keep us safe in this way. Surprisingly, as a society, we have not demanded the same type of simulated training for our medical professionals.

Studies support using VR for surgical training, with research showing that it is an effective tool for skill acquisition. A randomized study conducted at The David Geffen School of Medicine at the University of California at Los Angeles showed that medical students who were trained in VR completed the assessment 20% faster ($p = 0.002$), completed 38% more steps correctly ($p = 0.002$), and achieved significantly higher performance scores (17.5 vs. 7.5; $p < 0.001$) than students who used traditional training with surgical guides. Furthermore, upon retesting 2 weeks later to evaluate knowledge retention, the VR-trained students scored significantly higher across all assessment categories (19.9 vs. 7.2; $p < 0.001$).

VR is not intended to replace traditional training methods. Instead, it is intended to supplement and enrich our current methods of training, medical education, and skill acquisition. It can also mitigate the use of our limited and valuable resources (especially time, funds, and supplies).

The need to isolate during the pandemic opened the door for VR training to offer a safe way for individuals to learn skills and continue their education. Uniquely, VR also allows for group instruction and rehearsal. Providers joining a virtual operating room or "collaborative space" need not be in the same physical space or geographic region. The implications are vast and may include members of a surgical team preparing for a case or attending a live "face-to-face" instructional course. A surgeon with proficiency in a technique could offer instruction to a rural provider, or even a provider in another country, helping them to learn a new skill so that care can be provided locally. These rich experiences can occur without leaving home.

All of my defining experiences—as a woman and a relative minority in orthopaedics, as a professional with a desire to work in socioeconomically diverse and remote communities, and as a clinician with an elective surgical practice during a pandemic—have culminated in a sense of optimism regarding the mainstream global implementation of this technology.

As a medical community, we saw positive momentum and adaptation during the pandemic when we needed innovation the most. Instead of falling back into routines, we have the opportunity to use this momentum to progress, finally addressing the surgical training challenge that we all continually face, whether or not our careers face a pause.

VR is primed to be an equalizer for medical training and care. It levels the playing field by providing accessible training for medical providers and surgical teams, ensuring that our patients have consistent, and optimal, outcomes.

Beware of Musculotendinous Junction Rotator Cuff Tears!

Cheryl Gatot, MBBS
Singapore General Hospital
SINGAPORE

Hannah Marian Lie, MBBS
Lee Kong Chian School of Medicine
Nanyang Technological University
SINGAPORE

Denny Lie Tijauw Tjoen, MBBS, FRCS (Edin), FAMS
Singapore General Hospital
SINGAPORE

Introduction

Musculotendinous junction (MTJ) rotator cuff tears are defined as cuff failures that occur medially, with the lateral cuff tendon attachment remaining intact at the greater tuberosity insertion (Fig. 1). Infraspinatus and supraspinatus MTJ cuff tears have been described in case reports, with teres minor or subscapularis involvement being much less common[1]. The incidence of MTJ cuff tears is about 0.3%[2]. Because of their rarity, there is a paucity of literature and studies on such tears. However, when encountered in clinical practice, MTJ injuries can be challenging to treat, with implications on subsequent management and outcomes for patients. This article is a clarion call to be aware of this difficult type of cuff tear that, in our opinion, is increasing in incidence as more arthroscopic cuff repairs are performed worldwide.

01 MTJ tear of the supraspinatus tendon.

Etiology of Musculotendinous Junction Tears

MTJ injuries can be divided into 2 categories: (1) primary failures (those occurring without any previous surgery), or (2) secondary/type-2 failures (those that occur after a previous rotator cuff repair)[3].

Primary Failures

The etiology is multifactorial; such failures could result from direct trauma (heavy lifting, torsional injuries, or falls), degeneration, or intrinsic anatomical factors such as acromioclavicular osteoarthritis with inferior osteophytes. A history of steroid injections prior to these injuries had also been described.

Secondary Failures

The placement of suture anchors and knots in close proximity to the MTJ may increase stress concentration medially, causing tendon strangulation and subacromial knot impingement. The tendon tear occurs medial to the previous cuff repair site.

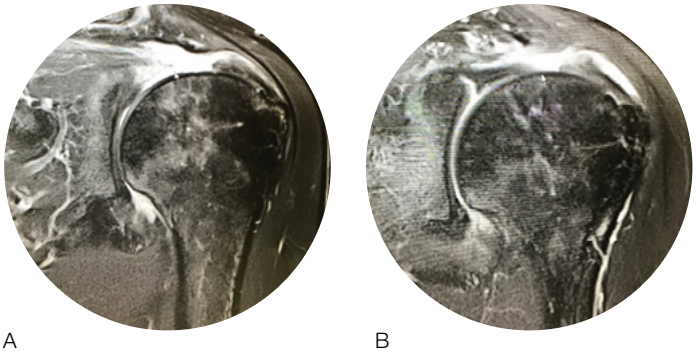
MTJ rotator cuff tears are rare in the Asian population. The majority of the MTJ cuff tears that we have encountered have involved the supraspinatus, with a large proportion of these injuries presenting in the setting of primary failures as opposed to secondary failures or revision cuff repair cases.

Investigations

Accurate diagnosis usually entails a combination of both preoperative imaging and a thorough intra-operative arthroscopic evaluation of the position and morphology of the tear. Early suspicion of an MTJ tear that is based on imaging studies may aid in a push toward earlier intervention, prior to worsening muscular retraction or complete fatty infiltration, leading to a greater possibility of restoring adequate soft-tissue tension during the repair. In some cases, however, preoperative imaging does not identify these tears, and the final diagnosis is made intraoperatively.

Magnetic resonance imaging (MRI) scans (Fig. 2) are commonly used to evaluate for MTJ cuff injuries. The tears can be classified into 3 radiological grades[4]: (1) strain (edema seen at the musculotendinous junction), (2) partial rupture (fluid-like signal intensity involving the musculotendinous junction), and (3) complete rupture (fluid-like discontinuity signal intensity traversing the musculotendinous junction).

Images should be carefully analyzed to avoid inaccurate diagnosis. In particular, a previously described “magic angle” effect suggests that tendon orientation at 55° to the static magnetic field shows markedly increased signal at the medial portion of supraspinatus tendon in healthy subjects. Careful evaluation of the T2-weighted images and the confirmation of signal intensity abnormalities in different planes should be undertaken before making a call on the presence of MTJ injuries.



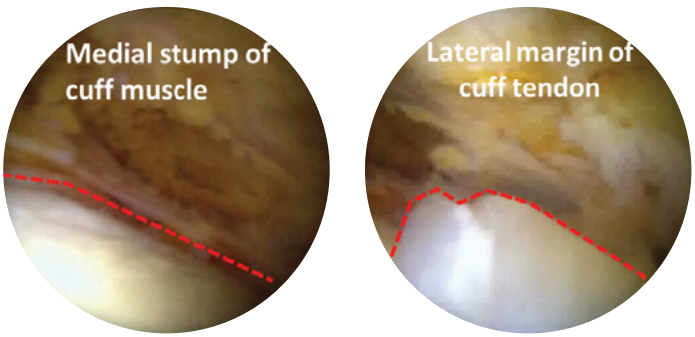
A B

02 MRI images of MTJ cuff tears.
02-A Shows the tear medial to the tendon stump still attached to the footprint laterally.
02-B Shows the tear above the biceps tendon, with a tear of the superior labrum visible.

Ultrasonography also has been used to aid in the diagnosis of MTJ tears, particularly infraspinatus tears. Sonographers place heavy focus on the infraspinatus fossa with the aim of identifying the "tadpole sign" on the longitudinal sections or the "black eye" sign on the sagittal sections. The "tadpole sign" illustrates the tendinous aspect of the muscle with its retracted stump, whereas the "black eye" sign illustrates a hypoechogenic myotendinous stump within the infraspinatus fossa.

Classification of Tear Morphology

Millett et al.[3] described 3 main tear morphologies and suggested surgical options to address them. The difference between the 3 morphologies is dependent on the degree of medial retraction of the medial tendon stump and fatty atrophy, with Type A being characterized by adequate medial tendon, Type B being characterized by deficient medial tendon with healthy muscle, and Type C being characterized by deficient medial tendon with retraction, muscle atrophy, and fatty infiltration. Figure 3 shows arthroscopic views of a Type-B supraspinatus MTJ tear with retracted muscle stump and healthy tendon at the lateral aspect.



03 Arthroscopic views of an MTJ tear of the supraspinatus tendon.

Management of MTJ Tears

Nonoperative Treatment

Nonoperative management may have a role in the treatment of incomplete MTJ injuries (strain or partial ruptures). Such treatment often involves physiotherapy and analgesia. For complete rupture of the MTJ, conservative treatment may lead to the development of high-grade fatty infiltration with functional deterioration. The surgical option is thus highly advocated for that degree of injury.

Operative Treatment

As with all rotator cuff repairs, the primary goals are to decrease the severity of symptoms (pain) and improve the functional outcomes of the shoulder in terms of strength, range of motion, and the ability to cope with activities of daily living. With MTJ tears, there is a risk of rapid progression to severe muscle fatty infiltration in <1 year[3]. Early treatment and repair can avoid such pathological progression and allow for the preservation of function in the affected rotator cuff.

The biomechanical aims of cuff repair are to maintain high fixation strength and to restore the tendon-footprint contact area and pressure in order to improve healing. For classic rotator cuff tears at the insertion, the repair involves tendon-bone interface healing when the cuff heals biologically to the bone. In MTJ tears, however, greater emphasis is placed on soft tissue-to-soft tissue fixation, healing of the medial tendon stump to the lateral tendon stump, and healing at the greater tuberosity[3].

The quality of muscle and the degree of retraction of the medial tendon stump have a great impact on the restoration of the length-tension relation of the cuff tendon. A short medial tendon stump or a degenerated tendon increases the risk of suture cut-through and adds to the technical challenge of repairing an MTJ cuff tear[5].

Repair Techniques and Concepts Based on Tear Morphology

Based on Millett's classification[3], the following repair techniques can be applied:

Type A: Complex suture-bridge repair with a double-row suture anchor construct can be used. Depending on the tear size, additional medial-to-lateral simple sutures also can be placed to bring the medial and lateral tear margins together (Fig. 4).

04 Schematic diagram of repair of an MTJ tear. A simple anchor-based repair is shown, bringing the medial muscle and lateral tendon stumps together.

Beware of Musculotendinous Junction Rotator Cuff Tears!

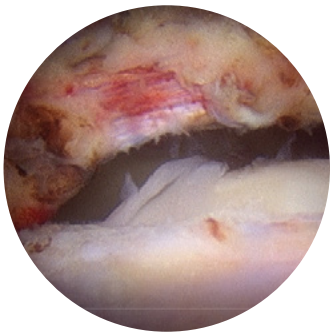
Type B: The challenge with these tears is often due to insufficient tendon length. Double-row repair with patch augmentation involving dermal allograft[5] can be applied in these cases in order to bridge the insufficient length of medial stump and to avoid over-tensioning the repair.

Type C: With poor muscle quality/fatty infiltration (Goutallier grade 3 or 4) and insufficient length, superior capsular reconstruction can be done with use of a fascia lata autograft or dermal allograft secured to the glenoid superiorly and greater tuberosity.

Our Preferred Technique

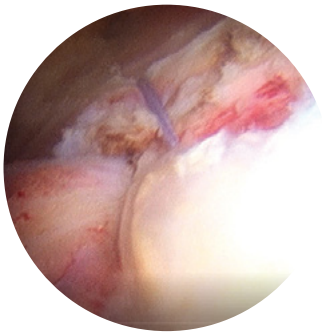
It is important to note the tear morphology during the arthroscopic evaluation. One often sees a large to massive retracted tear exposing the humeral head (Figs. 5 and 6). It is thus important to look for intact tendon lateral to the tear. Failure to recognize the intact tendon *lateral* to the tear and failure to mobilize the tendon would render a complete repair difficult to treat. It would be very difficult to mobilize and repair the medial tendon to the original footprint if the lateral tendon were to be missed or inadvertently debrided away.

05 Intra-articular image of an MTJ tear of the anterior supraspinatus, with tendon visible lateral to the tear, exposing the biceps tendon. (This is the arthroscopic view of the MRI image seen in Figure 2.)

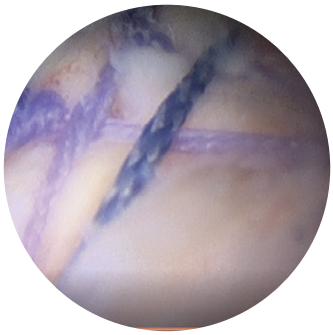


06 Another intra-articular image of an MTJ tear of the supraspinatus. In this example, the gap is wider, exposing the humeral head.

With adequate mobilization, the medial muscular and lateral tendinous stumps should be apposed with little tension. The tear is then repaired as shown in Figure 7, and the repair is secured with dual-row suture bridge configuration as shown in Figure 8. If the tendons are too degenerated or if the gap is too large, then patch augmentation or superior capsular reconstruction may need to be performed[5].



07 Initial convergence of the medial and lateral tendons. The medial muscular and lateral tendon stumps are first tied together.



08 The final repair is then completed with a dual-row suture bridge configuration, spanning the tear and compressing the lateral tendon stump.

Outcomes Following Musculotendinous Junction Repairs

There have been few published studies on the outcomes of MTJ cuff repair, attesting to the rarity of such tears. Walch et al.[1], in a 2009 study of 59 MTJ tears of the infraspinatus, reported that fatty infiltration occurred more rapidly as compared with conventional rotator cuff tears. Early arthroscopic intervention prior to the development of fatty infiltration could possibly restore muscle tension.

Lädermann et al.[2], in 2012, presented a case series of 5 patients with supraspinatus MTJ tears. All patients received nonoperative management, and for 3 patients with complete MTJ ruptures, this treatment led to muscle retraction and grade-4 fatty infiltration, with poor satisfaction scores.

A lack of awareness surrounding these MTJ lesions has potentially led to underdiagnosis and the use of different intervention methods, making it challenging to analyze and compare outcomes. Over the years, there has been an increased understanding of these challenging tears. In 2020, Hall et al.[5] described the early outcomes for 9 patients with Type-2 MTJ tears that were repaired with dermal allograft augmentation. At the end of 2 years, pain scores improved, functional scores were high, and repair integrity was maintained.

Musculotendinous Junction Rotator Cuff Tears: Future Directions

In summary, MTJ cuff tears are rare, but in recent years, there has been an increase in the awareness and understanding of these tears. Arthroscopic identification of such tears is integral, followed by adequate mobilization of the remaining tendons. Each MTJ tear is unique, and various repair techniques have been described. The key aims are to achieve soft tissue-to-soft tissue apposition with minimal tension and to secure the repair with a suture-bridge technique.

In our opinion, the incidence of MTJ tears may increase as more and more arthroscopic cuff repairs are performed worldwide. Beware and be aware of these challenging tears!

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The Effects of Smoking on Clinical Outcomes of ACL Reconstruction

Sung-Jae Kim, MD, PhD
The Arthroscopy and
Joint Research Institute
Yonsei University College of Medicine
Seoul, KOREA

Min Jung, MD, PhD
The Arthroscopy and
Joint Research Institute
Yonsei University College of Medicine
Seoul, KOREA

Introduction

In the field of orthopaedic surgery, smoking has been reported to adversely affect fracture risk, fracture healing, wound repair, and lumbar disc disease. The clinical outcomes of anterior cruciate ligament (ACL) reconstruction can be influenced by operative, biological, and environmental factors. Cigarette smoking also can be considered as one of the factors that adversely influences the outcome of ACL reconstruction. The harmful effects of smoking on the results of ligament healing have been reported previously[1-4]. The purpose of the present article is to briefly describe the harmful effects of smoking on ACL reconstruction as reported in previous studies.

Basic-Science Studies

No basic-science study on the relationship between cigarette smoking and ACL graft healing has been conducted, to our knowledge. However, two experimental studies have been performed to assess the effect of smoking on the healing of the medial collateral ligament (MCL) in mice[1,5]. On the basis of those studies, we can infer the relationship between smoking and ACL healing. In the first study, Gill et al. assessed the effects of smoking on the injured MCL at the molecular level in terms of cellular density and extracellular matrix synthesis[1]. In the smoking group, decreased gene expression of type-I collagen resulted in a decreased level of type-I collagen protein at the ligament injury site. The decreased synthesis of type-I collagen in the smoking group led to a delay in the restoration of biomechanical stability of the ligament. In the second study, Wright et al. evaluated the adverse biomechanical effects of smoking on the injured MCL in terms of ligament stiffness and strength[5]. Although that study did not reveal a dose-dependent effect of cigarette exposure on the biomechanical properties of healing ligaments, harmful effects of smoking on the stiffness and strength of the injured MCL during the ligament healing process were noted.

Clinical Studies

Several clinical studies have evaluated the effect of smoking on the outcomes of ACL reconstruction. Some studies have shown that smoking has detrimental effects on the clinical outcomes of ACL reconstruction, whereas other studies have indicated that the effects of smoking on the results of this procedure are not clinically relevant[2-4].

Karim et al.[2] compared the outcomes of ACL reconstruction between smokers and nonsmokers in terms of stability and functional outcomes. Bone-patellar tendon-bone and four-strand hamstring grafts were used. Inferior results in terms of stability and the International Knee Documentation Committee (IKDC) score were noted in the smoking group as compared with the nonsmoking group. The intensity and frequency of pain were greater in the smoking group as compared with the nonsmoking group. Return to the preinjury level of sport was also less likely in the smoking group.

On the basis of the basic-science and clinical studies mentioned above[1,2,5,] we performed a retrospective study in order (1) to compare the clinical outcomes of ACL reconstruction between current smokers, former smokers, and nonsmokers; and (2) to investigate dose-dependent effects of smoking on the outcomes of ACL reconstruction[4]. At the time of the 2-year follow-up, the smoking group had inferior clinical outcomes (including with respect to anterior stability) and inferior functional outcomes (including the Lysholm knee score and IKDC score) as compared with the nonsmoking group. The results of that study did not show a proportional dose-dependent effect of smoking on the outcomes of ACL reconstruction. However, heavy smokers had inferior results in terms of stability and the IKDC score as compared with light smokers. That study showed that cigarette smoking affected adversely the outcomes of ACL reconstruction, that heavy smoking yielded poorer outcomes compared with light smoking, and that former smokers had no additional adverse outcomes as compared with nonsmokers.

In another study, we assessed the choice of graft for ACL reconstruction in terms of stability and functional scores in smoking patients[3]. Each group was classified into four subgroups according to the ACL graft type (bone-patellar tendon-bone autograft, hamstring tendon autograft, quadriceps tendon-bone autograft, and Achilles tendon-bone allograft).

At the time of the 2-year follow-up, there was no significant difference in outcomes between graft types among nonsmoking patients. However, anterior stability and functional scores differed significantly between graft types among smoking patients. The Achilles tendon-bone allograft had the worst outcomes, whereas the bone-patellar tendon-bone autograft had most satisfactory results. On the basis of those findings, the bone-patellar tendon-bone autograft is recommended for ACL reconstruction in smoking patients.

Smoking and Healing of Reconstructed ACL Graft

The pathophysiological effect of smoking on the ACL graft has not been determined. However, during smoking, a variety of chemical components (including nicotine, nornicotine, anatabine, and anabasine) and gases (including carbon monoxide, ammonia, hydrogen cyanide, and benzene) are released. Nicotine is thought to be a main component that adversely affects ACL graft healing because nicotine causes vasoconstriction and impedes the delivery of oxygen to tissues, leading to hypoxia. Carbon monoxide can interrupt oxygen transport by hemoglobin, and hydrogen cyanide can decrease oxidative metabolism for cellular repair. Graft healing processes such as intra-articular graft remodeling and intra-tunnel graft incorporation can be affected by these harmful substances associated with cigarette smoking.

Among the various phases of the graft healing process, smoking could mainly impede the healing process of reconstructed ACL graft during the proliferation phase. The constant increase of cellularity and extracellular matrix changes that occur during the proliferation phase can be adversely affected. During the proliferation phase, remodeling and revascularization actively occur. Decreased cellular oxygen transport could result in a delay in graft healing during this phase. A decrease in collagen synthesis in smokers also may lead to a delay of intra-articular remodeling of the reconstructed ACL graft. Intra-tunnel graft incorporation after ACL reconstruction also can be adversely affected in smokers. Intra-tunnel graft incorporation consists of bone-to-bone healing or tendon-to-bone healing. Bone-to-bone healing can be impeded by delayed vascularization also shown during fracture healing or bone-grafting procedure in smokers. Tendon-to-bone healing process can be disturbed by inhibition of collagen synthesis by smoking.

Conclusion

Previous studies have indicated that cigarette smoking causes a delay in graft healing and adversely affects the clinical outcomes of ACL reconstruction. On the basis of those studies, we recommend that smokers be advised to quit smoking before ACL reconstruction in order to help improve the clinical outcomes of the procedure.

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United States Title IX Legislation: Revisiting the Statute at 50 Years (1972-2022)

Elizabeth A. Arendt, MD
Member of the Gender and Diversity Task Force
Department of Orthopedic Surgery, University of Minnesota
Minneapolis, Minnesota UNITED STATES

This article has been approved and edited by the head of the task force on gender and diversity.

Title IX, an educational amendment that was passed in the United States in 1972, is a federal law that prohibits sex-based discrimination in all educational programs and activities in the U.S., including athletics. The exact wording of the statute is: "no person in the United States shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity receiving federal financial assistance." The reason why this statute had such an impact on women's sports in the U.S. is that, unlike many countries outside the U.S., the athletic activity in secondary and college-level years was largely housed in educational institutions and was funded by student fees. With increasingly more women on campus, it became more important for the athletic budget to reflect the representation of male and female students. This legislation had a profound effect on parity within our educational institutions.

The legislation originally was intended to eliminate sex-based discrimination and ensure that all students, both male and female, would have access to quality education. In addition, it offered a wide range of protections for under-represented groups in the areas of athletics, admissions, housing, and sexual harassment. Title IX did not specifically address athletics, nor did members of the U.S. Congress who supported its passage envision it as a sports law. As Title IX was implemented in the late 1970s, the reactions to Title IX's application to athletics were intense, both for and against. Lawsuits followed, mostly in an effort to protect men's sports; one lawsuit by the National Collegiate Athletic Association (NCAA) tried to carve out men's basketball and football from consideration of "parity."

The main impact of Title IX was on education in that members of both sexes began to be able to take the courses that they wanted to take. The statute provided increased opportunities for women to go into the sciences as well as to receive technical training in areas such as plumbing, welding, and carpentry, which previously had been dominated by men. Women's participation in careers that involved technical education programs increased from virtually 0% to 25% nationally. Title IX worked both ways, allowing men to sign up for programs such as nursing, teaching, and other traditionally "female careers."

Title IX is credited with decreasing the high school dropout rate among girls and with increasing the number of women who went on to pursue higher education and complete degrees. Following the 1972 amendment, more women were attending colleges and earning degrees than ever before. In 1970, 44% of women in the U.S. graduated from high school and only 11% went on to get a college degree. Today, 91% of women in the U.S. complete high school, with approximately 40% going on to earn degrees from colleges and universities.

Women also made gains in leadership roles such as university faculty members and professors. The representation among all tenured and tenure-track positions offered in STEM fields (Science, Technology, Engineering, and Mathematics) increased from 9% in 1979 to >30%. Before 1972, women earned just 7% of all law degrees and 9% of all medical degrees. Today, they earn approximately half of all law and medical degrees.

Perhaps the most visible consequence of Title IX legislation was increasing female participation in athletics and sports. Before Title IX, 1 in 27 girls played organized sports in high school; today, 1 in 1.5 play an organized high school sport. Before Title IX, 150,000 girls were involved in sports and physical activity; today, 2.5 million girls are involved in sports and physical activity and one-third of all female students are involved in some form of sports or physical activity. Before Title IX, 30,000 women played college sports (compared with 170,000 men); today, both male and female student-athletes continue to set participation records. From 2002 to 2020, men gained nearly 73,000 participation opportunities, while women gained >67,000. NCAA Division I athletics has the highest participation in championship sports for women, with 47% of all student-athletes identifying as female.

Despite significant gains, analysis shows that most U.S. intercollegiate athletic departments are not meeting the standards that Title IX sets for schools to demonstrate equity in sports opportunities. Even when women are given the opportunity to play, schools fail to provide equitable economic support. Specifically, women receive less athletic scholarship support; frequently have less-comparable facilities, uniforms, and sporting equipment; and are supported by less-experienced coaches.

It is important to understand that Title IX was not designed to ensure that male and female programs receive the same amount of money; it was designed to enforce equal access and equal opportunity. Before Title IX, few opportunities existed in female athletics. In the United States, sporting activity in the high school and college years is primarily formed within and around our educational system. The NCAA, created in 1906 to enforce rules in men's football, eventually became the ruling body of college athletics. Originally, no athletic scholarships and no post-season championships existed for women.

With the passage of Title IX, educational institutions had to provide both sexes with opportunity that was substantially proportionate to the respective gender enrollments. When implemented, Title IX effectively turned into a form of affirmative action for females (and males) across many areas, with perhaps athletic participation having the most visible gains.

It is important to note that Title IX does not apply only to female students but to all individuals involved in educational activities that receive federal funding. In addition, it protects all students from sex-based discrimination, violence, harassment, or other discrimination based on sexual orientation or gender identity. In the last decade, the Title IX narrative has shifted to be more inclusive of providing protection and justice for victims of sexual harassment and assault. This protection extends to students who are pregnant and parenting, members of the LGBTQ+ community, teachers, coaches, and athletes.

Currently, all school districts and institutions of higher education in the U.S. are required to employ at least one Title IX Coordinator to coordinate the school's compliance with Title IX. This compliance includes providing the means for reporting harassment or violence as well as the ability to seek help. Despite the high prevalence of sexual harassment and discrimination in U.S. educational institutions, few students report such incidents to their schools, and many reported issues are not acted upon with credible action or enforcement.

As we recognize the 50-year anniversary of Title IX in the U.S., it is wise to reflect on the wins as well as areas for improvement. Title IX can be credited with affording opportunity and advancement for many female students in U.S. educational institutions, both academically and in athletics. The implementation, regulation, and enforcement of Title IX has been difficult and perhaps not universal, but the numbers have shown that this legislation has brought about positive change in the U.S. Groups with recommendations to strengthen and enforce legislation against discriminatory behavior for all under-represented groups continue to challenge lawmakers. The last 50 years have allowed for remarkable changes in the U.S. education system that will continue to have a positive effect on gender parity in sports and education worldwide.

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AANA/ISAKOS Knee & Shoulder Arthroscopy Course Recap

John G. Lane, MD
Musculoskeletal and
Joint Research Foundation
San Diego, CA UNITED STATES

As part of our ongoing commitment to furthering education and training, ISAKOS collaborated with AANA to offer a unique opportunity for a laboratory course which was held at the state-of-the-art M.A.R.C. Institute in Doral, FL, on November 18 and 19, 2022. The meeting was co-chaired by ISAKOS president, Guillermo Arce, MD, from Argentina, and Education committee chair, John G. Lane, MD, from the United States. AANA provided co-chairs Nicholas Sgaglione, MD, and Larry Field, MD, both from the United States. Faculty were invited from the membership of ISAKOS and AANA. ISAKOS faculty were primarily physicians who were able to provide instruction in Spanish and included Ivan Encalada, MD (Mexico), Vicente Gutierrez, MD (Chile), Philippe Landreau, MD (United Arab Emirates), Paulo J. Llinas, MD (Colombia), Robert Marx, MD (UNITED STATES), Mary Mulcahey, MD, (UNITED STATES), and Daniel Slullitel, MD (Argentina). Interest in this course was quite high; applications for the course exceeded the number of spots available in the lab. On November 18, the course held a cadaver laboratory for knee procedures. On November 19, there was a separate lab for shoulder procedures. Attendees had the option to participate either in the knee program, the shoulder program, or to attend both courses. Therefore, we were able to provide opportunities for people with varying practice profiles.

The course was groundbreaking in multiple areas. It provided registrants with the opportunity to view prerecorded videos in both English and Spanish which were accessible prior to the hands-on labs. Having access to bilingual presentation videos in advance allowed the attendees to focus on the surgical procedures and skills training in which they were most interested in order to optimize laboratory time. Therefore, by the time most of the attendees arrived in the Miami area, they had spent time reviewing procedures and had arranged a plan of how they desired to sequence their operations. They were able to focus the entire day performing surgical procedures on the cadavers as opposed to splitting the time between didactic lectures and laboratory procedures. It appears that this allowed registrants to be better prepared to perform numerous procedures. Consequently, the attendees were able to perform many more procedures in a single day.

Faculty and attending surgeons travelled from North and Latin America, India and the Middle East to attend the course. Instructors were assigned to laboratory stations based on the language preferences of the attendees in order to help navigate cutting-edge surgical procedures in Spanish and/or English, optimizing the educational opportunities for attendees. Various floating faculty were able to provide expertise regarding various technical tips associated with complex operative procedures. This allowed the attendees to be able to have culturally relevant experiences with expert assistance from physicians who practice in similar healthcare systems. Physicians attending the course commented that it was very helpful to have several languages offered so that they could better understand the nuances of the surgical skills they desired to master.

Initial introduction and preparation to begin the laboratory experience. Faculty and surgeons attending the course.

In addition to providing excellent education, the meeting provided the opportunity to develop professional relationships and friendships between faculty and attendees, as well as between ISAKOS and AANA members. During the cadaver lab for shoulder procedures, three physicians from Latin America shared a shoulder specimen; their varying experience levels fostered interactions between them as the resident focused more on basic techniques, such as arthroscopic subacromial decompression, while the surgeon with 5 years of experience focused on labral repair procedures. The senior physician spent time performing more complex procedures such as the remplissage procedure. It appeared that all three physicians enjoyed collaborating. This course was very well received by the physicians who attended; its success suggests that future laboratory courses sponsored by the collaboration of other societies would create a great educational opportunity. ISAKOS would like to thank the physicians who kindly volunteered their time to this educational endeavor.

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*Donated after August 1, 2022

ISAKOS with APKASS & TOSSM Knee & Shoulder Surgical Skills Lab Recap

David A. Parker, MBBS, BMedSc, FRACS
Sydney Orthopaedic Research Institute, University of Sydney
Sydney, AUSTRALIA

Last September, ISAKOS partnered with the Asia Pacific Knee, Arthroscopy and Sports Medicine Society (APKASS) and the Thai Orthopaedic Society for Sports Medicine (TOSSM) to run a skills lab for surgeons from the Asia Pacific region, with a goal of providing teaching for surgeons of all levels of expertise from countries in the region, particularly lesser developed countries. The course was conducted at the Chulalongkorn University Lab in Bangkok, a wonderful facility with 20 cadaver stations, and we are very grateful to the staff at Chulalongkorn for their fantastic organisation and support for this event.

The full day course allowed registrants to choose between shoulder or knee arthroscopic techniques. In the knee section participants covered everything from basic arthroscopic techniques, meniscus repair, ACL reconstruction, MPFL reconstruction, and multiligament reconstruction. In the shoulder section participants covered many techniques including Bankart repair, SLAP repair, massive cuff repairs, and open Latarjet procedures. Expert faculty from around the world included Guillermo Arce, Sachin Tapasvi, David Parker, Brett Fritsch, Patrick Yung, and Daniel Slullitel. There were also excellent local faculty from Thailand including Bancha Chernchujit, Ekavit Keyurapan, and Chanakarn Phornphutkul.

In order to increase participants' time in the cadaver lab, faculty pre-recorded presentations for registrants to view prior to the course. Therefore, there were no didactic lectures on the day, and after a brief introduction, registrants were able to go straight to the lab and begin practising their surgical techniques. In all there were 14 lectures prepared by faculty for the participants, which remain available for viewing now via the ISAKOS Global Link site.

As part of the registration process, participants were asked about their level of experience and the procedures they particularly wanted to learn. In this way, registrants were allocated to cadaver stations with other registrants of similar experience and with similar interest, in order to optimise the learning experience for each person. Each station had 2-3 registrants, allowing all to get plenty of hands-on experience.

There was great interest from surgeons in the region, with 47 registrants from a total of 19 different countries. The majority of participants were younger surgeons under the age of 45. Registration was free for ISAKOS members from developing countries, in order to make the course as accessible as possible. Feedback collected from the registrants after the course was universally positive, indicating that all participants had obtained a valuable learning experience.

After completion of the course, many faculty and registrants went on to attend the wonderful APKASS meeting at Pattaya beach which commenced the following day, and was another great event put together by the teams from APKASS and TOSSM. The meeting took place over 3 days, and had excellent scientific content and discussion, and of course memorable social events.

These cadaveric courses obviously require a huge amount of preparation and effort on the part of many people, and as such there are many people to thank for making this possible. We are very grateful to Conmed, Smith & Nephew, and Arthrex for supplying arthroscopic equipment and the surgical instruments essential to practice these techniques. A big thanks also to the surgeons and staff from TOSSM, and the staff at the Chulalongkorn University lab for the incredible effort in organising and running the facility on the day. And finally we are very grateful to the ISAKOS and TOSSM faculty for giving up their valuable time to prepare on-line lectures and teach during the lab. These courses are a huge team effort, and can only happen with the genuine enthusiasm for education that all of these groups clearly have.

ISAKOS' mission is to "advance the worldwide exchange and dissemination of education, research, and patient care in arthroscopy, knee surgery and orthopaedic sports medicine" and courses like these go a long way towards achieving this mission.

ISAKOS has many educational programs beyond our biannual congress, and these regional cadaveric skills labs are one of the ways in which we have committed to reaching the many regions of the world on a regular basis. For this particular course there was a goal to reach out to the South East Asia region, to help educate and train surgeons such that they not only improve the care of their own patients, but can help share these skills with colleagues in their home countries to further enhance the quality of patient care.

ISAKOS has committed to running these regional skills labs on a regular basis in different regions of the world every year, as part of our ongoing commitment to global education in arthroscopy, knee surgery and orthopaedic sports medicine. We look forward to seeing you at a course in your part of the world very soon!

Inaugural ISAKOS Knee Arthroplasty Forum Recap October 20-21, 2022 Viña del Mar, Chile

David Figueroa, MD
Professor, IKAF Co-Chair
Facultad de Medicina Clinica
Alemana - Universidad del Desarrollo
Santiago, CHILE

Total knee arthroplasty (TKA) is one of the most successful and common medical interventions worldwide, with >1 million procedures performed last year, giving patients a greater quality of life through pain relief and restored function of the knee joint.

As a scientific society, we cannot be oblivious to the impact and repercussions of osteoarthritis of the knee, which is considered to be a major problem in public medicine today.

Over the last few years, innovative technology has been explored to improve clinical outcomes through improved surgical techniques, soft-tissue balancing, and proper component positioning. Smart tools, sensors, computer navigation, and robotic systems are some of the new technological advancements that have been introduced to improve accuracy and reproducibility. The long-term benefit of innovative technology in TKA is still under investigation and will be further explored in the years to come. As technology advances, the evolution of TKA will continue through constant collaboration among surgeons across the globe in the hope of providing patients with improved function, greater durability, and a natural-feeling knee.

As the world's only truly global knee society, ISAKOS held its first international forum dedicated entirely to knee arthroplasty on October 20-21, 2022, at the Sheraton Hotel in the beautiful city of Viña del Mar, Chile.

Over the course of 2 days, the participants (including 22 faculty members, 4 moderators, 2 chairmen, and 250 attendees) engaged in presentations, discussions, and debates focusing on such topics as the current selection criteria for patients with knee arthritis who are likely to benefit from total or unicompartmental knee arthroplasty; how to incorporate new protocols for joint arthroplasty into practice; strategies for patient selection, perioperative optimization, and postoperative management; appropriate surgical technique; the concepts of alignment and balancing when performing unicompartmental knee arthroplasty as well as primary and revision total knee arthroplasty; and the diagnosis and treatment of acute and chronic periprosthetic knee complications.

The latest data and recommendations regarding evolving concepts in knee arthroplasty, including outpatient surgery, robotic-assisted surgery, and new technologies, were also discussed.

In a new and innovative format, most of the lectures were uploaded in advance on the forum's web page so that delegates could check the presentations before attending. This new format avoids the previous schemes of long and boring lectures, leaving more time for live discussions of the main topics.

Most of the topics were based on clinical case presentations, debates, crossfire sessions, and discussions that engaged the attendees and stimulated their active participation.

The evaluation and feedback from the audience indicated that this first forum dedicated completely to knee replacement was a complete success. The dynamic faculty members, the prerecorded video resources, and the new and innovative format were evaluated with the best marks from the audience.

This first forum dedicated entirely to knee arthroplasty marks just the beginning of a new era. We are already working to plan our second forum for 2024, when we will again discuss advances in the knowledge of degenerative knee pathology and knee arthroplasty in keeping with our Society's mission of enhancing education and research in this area while promoting innovative and new formats of learning to improve the participation of the audience.

Richard B. Caspari Award

Emmanouil Brilakis, MD, MSc, PhD
Hygeia General Hospital
Athens, GREECE

The Richard Caspari Fellowship Nominated by ISAKOS in Honor of Richard B. Caspari, MD (1942–2000)

The ISAKOS Fellowship and Awards Program is committed to recognizing and honoring surgeons and researchers whose work has contributed to better understanding and communication within the fields of Arthroscopy, Knee Surgery, and Orthopaedic Sports Medicine. The Richard B. Caspari Award was established to stimulate and reward abstracts and presentations on the upper extremity. Since the 2003 ISAKOS Congress in Auckland, New Zealand, a monetary prize has been awarded, in honor of Dr. Caspari, to the best upper extremity paper included in the scientific program of the Congress. Registration to the ISAKOS Congress is waived for the four finalists. The first and second-place winners receive a framed certificate at the Congress along with an honorarium and are encouraged to submit their manuscripts for possible publication in the *Journal of ISAKOS*.

Dr. Caspari was exposed to arthroscopy early in his career. He embraced it with tremendous energy and enthusiasm, becoming a pioneer in shoulder arthroscopy. Dr. Caspari was a creative innovator, holding numerous patents for medical devices that advanced arthroscopic surgery to another level. He loved participating in motor skills workshops, identifying the problems that participants were having, and developing instrumentation that would make their tasks easier. His inventions included leg holders, suture punches, shoulder traction devices, and motorized cutters.

He was also a teacher who mentored other arthroscopists, making him a leader in the field and one of the most influential arthroscopic surgeons of the millennium.

Dr. Caspari was born in Montgomery, Alabama. He graduated from the Medical School of the University of Florida and did his residency under Dr. Fred Reynolds at Washington University in St. Louis, Missouri. He served in the U.S. Navy from 1968 to 1970 on a submarine. He practiced his entire career with Tuckahoe Orthopaedic Associates, Ltd., in Richmond, Virginia. He was a founder and director of Orthopaedic Research of Virginia, a non-profit teaching and research foundation that has trained numerous Fellows in arthroscopy and sports orthopaedics. He has been a distinguishing member of AANA since 1981, serving on the Board of Directors and as Chairman of the Journal Board of Trustees. He was the Treasurer of the Association, and ultimately was elected President, serving from 1990 to 1991. In his Presidential Address, he pointed out that “arthroscopy is not a technique, but a subspecialty.” He stated that arthroscopy was an original way to think about problems and solve them.

Dr. Caspari was a great teacher. “When working with him in the lab or the operating room, one always left a better surgeon,” wrote John F. Meyers in a tribute article published after Dr. Caspari’s death. Dr. Caspari was the Chairman of the Metcalf Memorial Seminar from 1993 to 1996. His lectures were always logical, concise, and well received. He wrote numerous articles and chapters and edited many texts on arthroscopy. He was generous with his time, knowledge, and financial resources.

The Orthopaedic Learning Center in Rosemont, Illinois, had been one of his dreams and grew as a result of Dr. Caspari’s efforts. He was the most significant personal contributor to the fundraising effort while also raising funds from the surgical instrument industry. He served as a Master Instructor for shoulder courses at this learning center from 1994 until his retirement in 1999.

Dr. Caspari was adventurous and entrepreneurial, attributes that likely explained his remarkable creativity in shoulder arthroscopy. He became a sailor at the end of his life and, after retiring from active practice in June 1999, was pursuing a lifelong goal of sailing around the world on his boat, the “Libreterre.” In his AANA Presidential Address in 1991, he described himself as “a rebel and renegade operating on the fringe.” In addition to sailing, his hobbies included hiking, bicycling, and woodworking. He was also an enthusiastic saxophone player. In the early 1990s, he began flying helicopters, obtained a commercial license to fly both helicopters and fixed-wing aircraft, and eventually formed a company that leased and rented helicopters. At one point, he was a popular substitute on the helicopter traffic report on a local radio station.

When asked to tell a short story describing the surgical skills of his friend, Dr. Huylebroek of Belgium emotionally recounted the following episode: “When I had my ski accident in 1995, with a complete rotator cuff tear and cartilage damage post-dislocation, I could not find a surgeon in Europe with enough experience to do the surgery arthroscopically, to allow me to operate a few days later. I sent the MRI to Dick, whose simple answer was, ‘I can do it so you will not be missed in your hospital.’ I left Belgium on a Thursday, and we had dinner together that night with his wife. He operated on me on Friday morning, and I did arthroscopies on Tuesday after the surgery. The buttons he used must still be in my shoulder.”

Dr. Caspari and his beloved wife Judy had two daughters, Robin Wassum and Kelley Caspari. Dr. Caspari sadly died from cardiac arrhythmia while enjoying skiing in Vail, Colorado, on January 19, 2000.

Resources

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Gary Poehling Award Recipient

Deepak Bhatia, MS(Orth), DNB(Orth)
SportsDocs® and
Sir HN Reliance Hospital
Mumbai, INDIA

Gary Poehling Award ISAKOS Best Paper – Elbow, Wrist and Hand

The inaugural Gary G. Poehling award session for the best elbow, wrist, and hand research paper was held at the 2017 ISAKOS Congress in Shanghai. A few years prior to that meeting, our team had initiated a series of research projects on the safety and feasibility of an all-endoscopic technique of distal biceps repair and reconstruction. The newly announced award was a great opportunity for us to showcase our research to an international group of elbow and wrist surgeons. Our paper, entitled "All-Endoscopic Distal Biceps Repair: Cadaveric Portal Safety Analysis and Technical Feasibility Using Two Fixation Techniques," was shortlisted as a finalist for this award. The award session included some excellent papers from China and the United States. Our paper described the technical feasibility of a new procedure, and I was prepared to face questions, comments, and critical suggestions from the attendees and judges. Finally, at the award ceremony, I was surprised and thrilled to hear ISAKOS President Philippe Neyret announce that our paper had been selected as the winner of the award. It was a proud moment when we realised that this was the first time that a research paper from India had won an ISAKOS award.

After the award ceremony, I had the opportunity to meet Dr. Gary Poehling himself. Dr. Poehling is a pioneer in elbow and wrist arthroscopy, and to meet him in person was an unforgettable moment. Dr. Poehling welcomed me into the Elbow, Wrist, and Hand committee, and, under the chairmanship of Professor Gregory Bain, I had an opportunity to work with ISAKOS on several projects over the next 2 years.

At the next ISAKOS meeting, held in Cancun in 2019, I was selected to be the Chairman of the Elbow, Wrist, and Hand committee. During the subsequent 2 years, during which the global outbreak of the COVID pandemic disrupted research and surgical teaching, our committee tried to maintain the educational objectives of ISAKOS by conducting webinars and newsletter/journal articles for members.

We also put together a book entitled *Arthroscopy and Endoscopy of the Elbow, Wrist and Hand: Surgical Anatomy and Techniques*; this book, with 132 chapters written by pioneering surgeons from across the globe, stands out as one of the most comprehensive resources on basic and futuristic techniques that currently is available in the literature.

I strongly believe that the Gary G. Poehling award was a turning point in my academic career and has helped me achieve my research and academic goals. The tremendous support that I have received from ISAKOS at every step, and the opportunity to work with the finest surgeons in this field, has helped me become a better surgeon, teacher, and mentor to my own trainees and fellows.

2022 RESEARCH GRANT RECIPIENT

New Researcher

Filippo Familiari, MD
Professor, Magna Graecia University
Catanzaro, ITALY

The ISAKOS New Researcher Grant allowed us to set up a robust study design to ensure high-quality research. Our team has designed a study (1) to evaluate the biological predisposition to pain persistence after total knee arthroplasty (TKA), (2) to determine whether such a predisposition derives from an alteration of the endogenous modulation of the nociceptive system, and (3) whether this predisposition is identifiable through a specific biomarker. Our results could have several positive impacts on the OA field. The identification of a specific biomarker that is able to predict the risk of persistent pain after TKA is easily monitored in a blood sample, and is associated with a specific pain profile, may offer exceptional help in guiding the design of tailored care for specific patient groups, improving treatment outcomes and reducing unnecessary suffering and costs. Specifically, it would permit a more accurate selection of patients through a simple blood sample, providing them with more accurate anticipations and augmenting the profits of surgery for each individual, likely also reducing litigation. Moreover, if our results are confirmed, they could be applied as predictive factors of chronic pain in all orthopaedic fields, including Sports Medicine. In this light, our results also could improve the informed-consent process by allowing a clearer presentation of postoperative associated risks, likely reducing litigations. We are confident that these findings will result in reporting at varied international meetings and multiple high-quality peer-reviewed publications.

Juan Pablo Martinez-Cano
Fudación Valle del Lili, Icesi University
Cali, COLOMBIA

Our group was selected as one of the winners of the ISAKOS New Researcher research grant. We thank the Scientific Committee and ISAKOS for this grant, which represents a great honor for our group—as well as a great responsibility to the society and our peers. The support that ISAKOS provides helps new researchers to develop new initiatives and continue the path of growing by performing scientific research for the benefit of our patients.

Young researchers in Cali, Colombia, can encounter some barriers to finding resources for research. With ISAKOS, we can receive grants to develop our research projects and bring our ideas to fruition. ISAKOS also offers traveling fellowship options that enable young investigators to visit expert mentors in research.

The patellofemoral joint has been the focus of our research in recent years, and our research project focuses specifically on the conservative treatment of patellar dislocation. Through a randomized controlled trial, we intend to investigate whether such treatment has advantages when compared with standard care. We hope to share our findings soon!

2022 RESEARCH GRANT RECIPIENT

Translational Research

Aaron Krych, MD
Mayo Clinic
Rochester, MN UNITED STATES

The generous award from ISAKOS has allowed us to expand upon the pilot machine learning algorithms produced using single-center data, including real-time learning utilizing extramural and multi-center data, implement more sophisticated learning methods, and augment existing data with additional tabular and imaging variables. Our current efforts have resulted in numerous peer-reviewed publications and presentations both at the regional and national level. We are optimistic that these algorithms represent the next step in the seamless integration of artificial intelligence into the sports medicine orthopedic surgeon's clinical practice and can improve both efficiency and outcomes in the management of ACL injury.

Countries with Limited Resources

Carlos Eduardo Franciozi, MD, PhD
Professor, Escola Paulista de Medicina–Universidade Federal de São Paulo
São Paulo, BRAZIL

The ISAKOS grant for Countries with Limited Resources was happily celebrated at Hospital São Paulo, which is located in the heart of the most populous city of Brazil and the entire southern hemisphere. As the adversities within the Brazilian public health system constantly challenge the quality of healthcare and limit the opportunities for the development and performance of studies, the grant represents a special gift to the main teaching hospital of Escola Paulista de Medicina-Federal University of São Paulo. It comes at a time when the hospital, after important transformations since the beginning of 2022, is recommitting itself to being the referral hospital for complex cases within our public health system.

The grant will assist with our prospective multiligament knee injury study, which is designed to evaluate the correlation between physical examination and imaging findings with respect to the diagnosis and the therapeutic plan. The study will address traditional and new physical examination maneuvers, magnetic resonance imaging, full-length standing radiographs, the digital Rolimeter, the Telos device, and varus-valgus and kneeling stress radiographs. Hopefully, it will contribute to better patient care and will expand the existing knowledge in the field.

All help is welcome! We thank the global community of ISAKOS for this initiative.

2022 RESEARCH GRANT RECIPIENT

Clinical Outcomes

Prof. Umile Giuseppe Longo, MD, MSc, PhD
University Campus Bio-Medico of Rome
Rome, ITALY

Jarret M. Woodmass, MD, FRCSC
Pan Am Clinic, University of Manitoba
Winnipeg, CANADA

Clinical Outcomes Grant: Identifying Predictive Features of Successful Recovery After Arthroscopic Rotator Cuff Repair: A Machine-Learning Approach

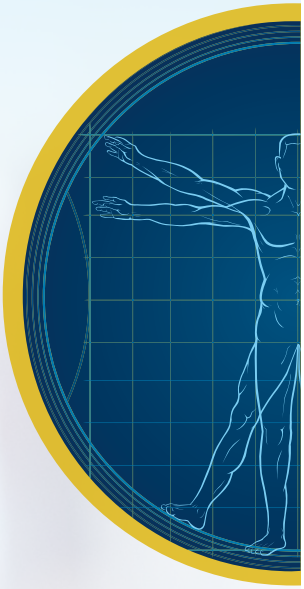
The proposal aims to reach new fundamental insights into the care of patients with rotator cuff tears by applying an innovative and integrated machine-learning approach for outcomes prediction after arthroscopic tendon repair. Identifying specific profiles using machine learning approaches—combining different subsets of multimodal data (i.e., MRI, clinical, psychological, and kinematic data)—may lead to customized care of patients with rotator cuff tears. We have submitted documentation for approval by the local Ethics Committee for study execution.

The ISAKOS Research Grants program will be essential for carrying on the clinical trial. We are very grateful to ISAKOS for their support and trust so far!

Dr. Woodmass received the ISAKOS 2022 Research Grant for New Investigators in October and is in the process of setting up and launching his study, "Comparing the Efficacy and Safety of Rotator Cuff Tear Treatment Options in Older Adults: A Randomized Controlled Trial of A Subacromial Balloon Spacer Versus Repair Surgery." He stated, "I and my research team thank ISAKOS and the scientific committee for the opportunity to submit our work. We are humbled to have been selected for this prestigious grant." As an early career investigator undertaking one of his first multi-center randomized trials, Dr. Woodmass will use the ISAKOS grant as a basis through which each site will seek further local funding.

Re-tears following rotator cuff repair (RCR) are a common complication, and the association between advanced patient age and re-tear has been well documented. Furthermore, postoperative recovery is challenging for older adults as the shoulder is immobilized for 6 to 8 weeks, impacting their independence. As a result, some older patients opt out of RCR, leaving them with few treatment options. The subacromial balloon spacer (SBS) was first introduced as a solution for massive, irreparable RC tears. The SBS is a biodegradable balloon that is implanted arthroscopically, ultimately restoring shoulder biomechanics and function. SBS requires less operative time and postoperative immobilization than RCR. The literature offers promising results with the use of SBS for the treatment of massive tears and more recently, surgeons have used SBS to treat smaller tears (i.e., medium/large tears) in older adults.

Despite the promising results, there are several gaps in the SBS literature. No studies have included medium/large tears, none have been powered to draw conclusions specific to older adults (≥70 years of age), and none have involved pure surgical groups (SBS or RCR alone). To address these gaps, Dr. Woodmass' interdisciplinary research team has designed the first multicentre randomized trial comparing SBS and RCR in older patients with medium/large/massive RC tears. Orthopaedic surgeons are often faced with new technologies with limited evidence to guide their use. With this in mind, Dr. Woodmass notes that "We are very excited for the opportunity to evaluate the use of the balloon spacer in older adult patients with rotator cuff tears to determine if improved outcomes can be achieved with reduced rehabilitation."



2022 RESEARCH GRANT RECIPIENT

Clinical Outcomes

Sergio Rocha Piedade, MD, MSc, PhD
Campinas State University—UNICAMP
Campinas, Sao Paolo, BRAZIL

ISAKOS Research Grant Winner: The 4-Domain Sports PROM Software

The 4-Domain Sports PROM is a research project that was started by the ISAKOS Sports Medicine Committee in 2017.

The first phase of this research was a systematic review of PROM in sports Medicine worldwide. Back then, our results showed no standardization and a lack of a PROM tailored to evaluate the postoperative outcomes regarding the physical and psychological demands of athletes and high-demand sports practitioners.

Therefore, the lack of this tool in the literature stimulated us **to go on to the second phase,** which was to develop and validate a 4-Domain Sports PROM tailored to assess athletes and active sports. It focuses on the main physical demands of athletes with no sports injuries, and the influence of sports practice on their quality of life, making this 4-Domain Sports PROM adaptable to different anatomical sites of injury and different sports.

After validating and publishing this 4-Domain Sports PROM, the third phase of this research project is the software development for clinical application in different languages.

The aims of this software are as follows:

- To improve the clinical applicability of the 4-Domain Sports PROM by creating a reproducible, easy, validated tool to accurately assess athletes and high-performance sports practitioners who have been treated for a sports injury.
- To optimize data collection from athletes and high-performance sports practitioners with respect to their recorded perception of injury, expectations of treatment, evaluation of postoperative care and treatment received, and outcomes compared with their physical demand of prior injury status (baseline).
- To group and analyze athletes according to their sports modality, anatomical site of injury, and type of surgical procedure in order to plot charts, compare and analyze the treatment outcomes with use of electronic devices (cellphones, computers, and tablets), and, ultimately, lead to advances in treatment.
- This research has produced a systematic review, two book chapters, and an article presenting the validation and implementation of this instrument.

The 4-Domain Sports PROM already has English and Portuguese versions and is now being translated into Chinese, Italian, Spanish, and French. I would like to thank ISAKOS for the financial support of our 4-Domain Sports PROM software research project.

Resources

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