Fast Break

Publication for team medical personnel

September 2022

WELCOME to FAST BREAK!

Welcome to Fast Break, the official quarterly news bulletin of the FIBA medial commission. Our goal is to introduce our FIBA sport medicine and sport science community to newsworthy research topics and develop a community of practice among physicians and clinicians involved with basketball at every level of play across the globe.

We hope this publication will foster friendly communication and discussion within the basketball world. We welcome and encourage your questions, comments, suggestions, and contribution to this publication.

MESSAGE FROM THE FIBA MEDICAL COMMISSION

Fingers crossed but it looks like the COVID-19 Pandemic is settling down. Then again, we are hearing less from government health authorities about the COVID risk and that might be just a communication strategy by government. What we do know is that certain demographic groups of the community are the most at risk and the basketball community is generally very low risk. This reflects what we have seen in our competitions which have been running (with COVID-19 protocols) since August 2020. Not a bad effort!

For sports medicine, and assuming the pandemic continues to settle, what will the future look like for team physicians? Expect FIBA to continue to mandate team doctors in travelling teams to FIBA competitions. This has been a good outcome from the pandemic – enhanced healthcare support for teams. In the future, expect the FIBA Medical Commission to develop stronger general infectious diseases policies and guidelines. Being a team physician, I'd like to know what viruses are floating through a team I am looking after. I'll be managing my viral illnesses more cautiously – stronger surveillance for symptoms, isolating those who are sick, seeking intel on what is floating around in the community and possibly more aggressive treatment, including the use of anti-virals. Hopefully, there will be further development of lateral flow diagnostic devices which includes other common viruses and not just COVID-19. They'd be in my travelling kit!

Stay well.

Dr Peter Harcourt

Chair, FIBA Medical Commission

MESSAGE FROM THE EDITOR

Slowly but surely, my vision for this communication is starting to take form. I am thrilled to present the first Fast Break edition that is not entirely my creation. This quarter, Dr. Andrew Pipe (Canada) is chatting about (anti)doping in sport, and Drs. De La Rosa-Cabral and Lamela Domenech (Puerto Rico) have contributed to the student's corner. This publication is starting to become an international collaboration. If there are specific topics or themes of interest to you that you would like to see this work cover, please let me know, or feel free to send me your comments for publication. Encourage your students to get involved. This effort is for us, but must also be from us if we are going to continue to develop a community of practice among physicians and clinicians involved with basketball at every level of play across the globe.

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IN THIS ISSUE

SELECTED PUBLICATIONS OF INTEREST

Physiological Responses and Technical-Tactical Performance of Youth Basketball Players: A Brief Comparison between 3x3 and 5x5 Basketball.

Figueira B, Mateus N, Esteves P, Dadeliene R, Paulauskas R
Journal of Sports Science & Medicine. 21(2):332-340, 2022 06.

This study aims to examine youth players' physiological responses and technical-tactical performance when playing simulated 3x3 and 5x5 basketball games. Fifteen well-trained male basketball players (16.6 +/- 0.2 years old) participated in scrimmage basketball games under two different conditions: 3x3 (half-court) and 5x5 (full-court). The players' heart rate, muscle oxygen saturation and total hemoglobin data were collected and computed to describe physiological responses, while video analysis was used to characterize their technical-tactical performance. A Bayesian one-way analysis of variance (ANOVA) was used to quantify the predictive influence of both game conditions on the physiological and the technical-tactical variables. The results indicated that different game conditions influenced the players' physiological responses slightly, as only hemoglobin sample entropy increased between the 3x3 and 5x5 game scenarios. Conversely, statistical differences in most of the technical-tactical variables were moderate and decisive in favour of the game condition model. Overall, this study emphasizes that playing 3x3 and 5x5 basketball games lead to relatively negligible differences in the players' physiological response but pronounced variations in their technical-tactical performance. Therefore, important implications may be drawn to the applied field as the specificity of technical-tactical adaptations when playing 3x3 or 5x5 formats should be considered by basketball coaches to better design the training sessions for players that fall within our sample age category.

Understanding 'monitoring' data-the association between measured stressors and athlete responses within a holistic basketball performance framework.

Mercer RAJ, Russell JL, McGuigan LC, Coutts AJ, Strack DS, McLean BD
PLoS ONE [Electronic Resource]. 17(6):e0270409, 2022.

This study examined associations between cumulative training load, travel demands and recovery days with athlete-reported outcome measures (AROMs) and countermovement jump (CMJ) performance in professional basketball. Retrospective analysis was performed on data collected from 23 players (mean+/-SD:age = 24.7+/-2.5 years, height = 198.3+/-7.6 cm, body mass = 98.1+/-9.0 kg, wingspan = 206.8+/-8.4 cm) from 2018-2020 in the National Basketball Association G-League. Linear mixed models were used to describe variation in AROMs and CMJ data in relation to cumulative training load (previous 3- and 10-days), hours travelled (previous 3- and 10-day), days away from the team's home city, recovery days (i.e., no travel/minimal on-court activity) and individual factors (e.g., age, fatigue, soreness). Cumulative 3-day training load had negative associations with fatigue, soreness, and sleep, while increased recovery days were associated with improved soreness scores. Increases in hours travelled and days spent away from home over 10 days were associated with increased sleep quality and duration. Cumulative training load over 3 and 10 days, hours travelled and days away from home city were all associated with changes in CMJ performance during the eccentric phase. The interaction of on-court and travel related stressors combined with individual factors is complex, meaning that multiple athletes response measures are needed to understand fatigue and recovery cycles. Our findings support the utility of the response measures presented (i.e., CMJ and AROMs), but this

is not an exhaustive battery and practitioners should consider what measures may best inform training periodization within the context of their environment/sport.

Impact of Basketball Match on the Pre-Competitive Anxiety and HRV of Youth Female Players.

Garcia-Ceberino JM, Fuentes-Garcia JP, Villafaina S
International Journal of Environmental Research & Public Health [Electronic Resource]. 19(13), 2022 Jun 27.

The present study aimed to investigate the impact of a basketball competition on the pre-competitive anxiety and Heart Rate Variability (HRV) of young female basketball players. A total of 12 female basketball players participated in this cross-sectional study. Girls had a mean age of 14 (1.41) years old and a mean experience of 4 (0.85) years practicing basketball. The pre-competitive anxiety and the HRV was assessed the week before and immediately before and after the match. Results showed a significant reduction (p-value < 0.05) of the several HRV variables after the match compared to baseline and pre-competition measures. However, differences between baseline and pre-competition were not found. Furthermore, a significant increase in somatic anxiety after the competition was reported. Taking into account HRV, somatic anxiety, and cognitive anxiety results, young female basketball players did not exhibit an increase in pre-competition anxiety. HRV measurements before competition can help coaches and physical trainers to identify female players with higher pre-competitive anxiety and propose intervention to manage it. Future studies should investigate the impact of coaches and parents on the pre-competitive anxiety of female and male basketball players.

"In your face": The transition from physical to symbolic violence among NBA players.

Lev A, Tenenbaum G, Eldadi O, Broitman T, Friedland J, Sharabany M, Galily Y
PLoS ONE [Electronic Resource]. 17(5):e0266875, 2022.

The NBA has undergone formative changes since commissioner David Stern began his tenure. Stern has endeavored to make the NBA a consumer-friendly and marketable league by implementing sanctions on physical violence. This study takes a closer look at Stern's efforts by examining the interplay between two forms of violence in NBA basketball players on the court: "old fashioned" physical violence (PV) and symbolic violence (SV). Of the 117 NBA finals broadcast for twenty years from 1998 to 2018, a stratified random sample (36 games or 30.8%) of the violations and commentators' comments were coded, providing a wide perspective on forms of violence over time. The findings reveal that although the number of PV incidents decreased, SV increased starting in 2014, to the extent that SV incidents were more frequent than PV. A thematic analysis of the commentators' remarks associated with these incidents showed that they support and encourage PV, whereas SV tends to be perceived as harmless and therefore permissible to ignore. Unlike PV, SV is not perceived to be as worthy of media coverage. The relative lack of commentator interest is indicative of the lack of "glamour" of SV in the NBA league. It is suggested that since viewers of professional sports often emulate the players, the increase of SV within the NBA is likely to be mirrored in fans in their everyday lives and in amateur basketball players. Although the rise in SV causes fewer physical injuries in professional basketball players, it nevertheless can cause psychological harm.

Enhancing High-Intensity Actions During a Basketball Game After a Strength Training Program With Random Recovery Times Between Sets.

Arede J, Leite N, Tous-Fajardo J, Bishop C, Gonzalo-Skok O
Journal of Strength & Conditioning Research. 36(7):1989-1997, 2022 Jul 01.

ABSTRACT: Enhancing high-intensity actions during a basketball game after a strength training program with random recovery times between sets. J Strength Cond Res 36(7): 1989-1997, 2022-To examine the effects of a strength training program with random recovery times between sets in consideration of several physical parameters, high-intensity actions, and spatial exploration index during a simulated basketball game. Twenty male basketball players (age: 19.45 +/- 4.36 years) were assigned randomly to either strength training group (n = 10) or control group (n = 10). The strength training included parallel back squat and bench press exercises, twice a week for the duration of 10 weeks, with 2 blocks of 5 sets x 5 repetitions interspersed with variable passive recovery (range = 15-35 seconds) between sets, and constant passive recovery (3 minutes) between blocks with the load that maximized propulsive power output. The pre- and posttest assessments included jumping (bilateral and unilateral), change of direction, straight sprinting, and a 5-on-5 full-court situation. The external training load was assessed using the local positioning system, and the internal load was recorded with the use of individual heart rate monitors. A significant interaction effect (group x time) was observed on countermovement jump, unilateral right hops, high-intensity accelerations and decelerations, and peak accelerations and decelerations in the 5-on-5 full-court situation. Relative improvements observed and recorded in the training group on unilateral right hops, accelerations, and decelerations were correlated. Similar results were observed on 0- to 25-m sprints, high-intensity decelerations, peak accelerations, and decelerations. Strength training paired with random recovery times enhanced physical and game-related aspects in the observed basketball players.

Influence of upper-limb muscle strength on the repeated change of direction ability in international-level wheelchair basketball players.

Iturricastillo A, Garcia-Tabar I, Reina R, Garcia-Fresneda A, Carmona G, Perez-Tejero J, Yanci J
Research in Sports Medicine. 30(4):383-399, 2022 Jul-Aug.

This study aims 1) to compare repeated change of direction ability (rCODA) and bench press (BP) between low (A category, <=2.5) and high (B category, >=3.0) sport classes and 2) to analyse the relationships between rCODA and BP performance in a sample of wheelchair basketball (WB) players. Seventeen world-class WB players volunteered participated in this study. All the players undertook two tests: the repeated (x12) Modified Agility T-test (rMAT) to measure the rCODA and the movement velocity in a BP test. No significant differences were observed between categories in the rMAT and BP. For the total sample, BP variables with a mean propulsive velocity of 1 m.s-1 (V1LOAD) largely correlated with all the full rMAT outcomes (r>-0.625; p< 0.05). Having a better BP could be favourable to perform repeated efforts and this seems particularly relevant in fatigue conditions, and especially for the B category players.

Psychological Responses to Progressive Exercise Until Voluntary Exhaustion: A Study of Adolescent Male Basketball Players.

Laki A, Ihasz F, Szabo A
Perceptual & Motor Skills. 129(3):869-891, 2022 Jun.

The affective experience during and after exercise helps determine motivation, commitment, and adherence to sports. Choice reaction time (RT) is critical in decision-making and sports performance. In this within-subjects laboratory experiment, we scrutinized core affect and choice RT in 18 male adolescent basketball players during exercise sessions performed to voluntary exhaustion and during a control condition. The adolescents performed choice RT tasks in one of two exercise conditions and in the control session. Participants ' feeling states differed between exercise and control sessions and decreased slightly even after moderate exercise intensity. Core affect also declined as the workload increased, but it remained pleasant-activated in all conditions. The RT errors increased at the peak exercise intensity. These results suggest that while high-intensity training might negatively affect young athletes' feeling states and impair their decision-making, their core affect remained positive, with large inter-individual variability. We discuss the practical implications of these results in adolescents' sports.

Prevalence and Pain Distribution of Anterior Knee Pain in Collegiate Basketball Players.

Hannington M, Tait T, Docking S, Cook J, Owoeye O, Bonello C, Emery C, Pasanen K, Edwards S, Rio E
Journal of Athletic Training. 57(4):319-324, 2022 Apr 01.

CONTEXT: Causes of anterior knee pain (AKP) in jumping athletes include patellofemoral pain and patellar tendinopathy. The differential diagnosis of AKP is challenging, with variations in clinical presentations. No previous research has used pain location to describe AKP in basketball players.
OBJECTIVE: To (1) describe the prevalence and pain distribution of AKP in collegiate basketball players and (2) report the prevalence of focal inferior pole pain using 2 outcome measures.
DESIGN: Cross-sectional study.
SETTING: University and collegiate basketball facilities in Alberta, Canada.
PATIENTS OR OTHER PARTICIPANTS: A total of 242 collegiate basketball athletes (138 women, 104 men).
MAIN OUTCOME MEASURE(S): The single-legged decline squat test (SLDS) was used to capture pain location via pain mapping (dichotomized as focal or diffuse) and pain severity (numeric rating scale). The Oslo Sports Trauma Research Centre Knee questionnaire (OSTRC-Knee) and adapted version for patellar tendinopathy (OSTRC-Patellar Tendinopathy Questionnaire [OSTRC-P]) were used to report the prevalence of AKP and patellar tendinopathy, respectively. Focal inferior pole pain during the SLDS was used to classify patellar tendinopathy.
RESULTS: Of the 242 players, 146 (60%) reported pain with the SLDS (unilateral = 64 [26%]; bilateral = 82 [34%]). A total of 101 (43%) described knee pain using the OSTRC-Knee. Pain mapping captured the variability in pain locations. Diffuse pain was more prevalent (left, 70%; right, 72%) than focal pain (left, 30%; right, 28%). Low prevalence of patellar tendinopathy was noted using the OSTRC-P (n = 21, 8.7%) and inferior pole pain during the SLDS (n = 25, 10.3%).
CONCLUSIONS: Diffuse AKP was common in Canadian basketball players; however, pain mapped to the inferior pole of the patella was not common. Few players reported tendinopathy using the OSTRC-P, suggesting that patellar tendinopathy was not a primary knee pain

presentation in this jumping cohort. Pain location, rather than the presence or severity of pain alone, may better describe the clinical presentation of AKP in jumping athletes.

Systematic Review of Injuries in the Men's and Women's National Basketball Association.

Lian J, Sewani F, Dayan I, Voleti PB, Gonzalez D, Levy IM, Musahl V, Allen A
American Journal of Sports Medicine. 50(5):1416-1429, 2022 04.

Abstract
BACKGROUND: Numerous studies have reported the incidence and outcomes of injuries in the men's and women's National Basketball Association (NBA and WNBA, respectively).
PURPOSE: To synthesize published data regarding the incidence and outcomes of all injuries in the NBA and WNBA in a comprehensive review.
STUDY DESIGN: Systematic review; Level of evidence, 4.
METHODS: Following PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines, we searched 3 electronic databases (PubMed, MEDLINE, Embase) for studies of all levels of evidence since 1990 pertaining to injuries sustained by active players in the NBA and WNBA. Studies were excluded if the cohort of interest included ≤3 active players.
RESULTS: The initial search of the 3 databases yielded 1253 unique studies, of which 49 met final inclusion criteria for this review. Only 4 studies included athletes in the WNBA. Based on the mean annual incidence, the 5 most common orthopaedic sports injuries sustained in the NBA were concussions (9.5-14.9 per year), fractures of the hand (3.5-5.5 per year), lower extremity stress fractures (4.8 per year), meniscal tears (2.3-3.3 per year), and anterior cruciate ligament tears (1.5-2.6 per year). Cartilage defects treated using microfracture, Achilles tendon ruptures, and anterior cruciate ligament injuries were 3 injuries that led to significant reductions in performance measurements after injury.
CONCLUSION: With advances in sports technology and statistical analysis, there is rapidly growing interest in injuries among professional basketball athletes. High-quality prospective studies are needed to understand the prevalence and effect of injuries on player performance and career length. This information can inform preventative and treatment measures taken by health care providers to protect players and guide safe return to play at a high level.

Effects of Small-Sided Games Training versus High-Intensity Interval Training Approaches in Young Basketball Players.

Arslan E, Kilit B, Clemente FM, Murawska-Cialowicz E, Soylu Y, Sogut M, Akca F, Gokkaya M, Silva AF
International Journal of Environmental Research & Public Health [Electronic Resource]. 19(5), 2022 03 02.

This study aimed to investigate the effects of the 6-week small-sided games training (SSGs) vs. high-intensity interval training (HIIT) on the psychophysiological and performance responses, and technical skills of young basketball players. Thirty-two male players (age: 14.5 +/- 0.5 years of age) were randomly divided into SSGs group (n = 16) and HIIT group (n = 16) training methods thrice per week for 6 weeks. The players in the SSGs group performed two 5-8 min of 2 vs. 2 with 2 min rest periods, while the players in HIIT performed 12-18 min of runs at intensities (90 to 95%) related to the velocity obtained in the 30-15 intermittent fitness test (IFT). Pre-testing and post-testing sessions involved assessments of Yo-Yo Intermittent Recovery Test level 1, 30-15 intermittent fitness test, 5 and 30 m sprint times, vertical jump height, repeated sprint ability,

defensive and offensive agility, and technical skills. The SSGs group demonstrated significantly higher agility-based technical responses in terms of the control dribbling and shooting skills (d = 1.71 vs. 0.20, d = 1.41 vs. 0.35, respectively) compared with the HIIT group. Conversely, the HIIT induced greater improvements in 30 m sprint times (d = 3.15 vs. 0.68). These findings provided that SSGs in youth basketball players may allow similar positive physical adaptations to HIIT, with an extra advantage of improving technical skills while improving enjoyability.

Impact of hip abductor and adductor strength on dynamic balance and ankle biomechanics in young elite female basketball players.

Dominguez-Navarro F, Benitez-Martinez JC, Ricart-Luna B, Cotoli-Suarez P, Blasco-Igual JM, Casana-Granell J
Scientific Reports. 12(1):3491, 2022 03 03.

This study aimed to evaluate, in an isolated and relative manner, hip abductor (ABD) and adductor (AD) strength and to study the extent to which these factors are related to balance and ankle dorsiflexion mobility in young elite female basketball players. Sixty trainee-level elite female basketball players (13-18 years old), who voluntarily agreed to participate in the study, were divided into three subgroups based on competition age divisions (U14, U16, U18). Isometric hip ABD and AD strength in each leg was evaluated using the ForceFrame Strength Testing System, also calculating the strength ratio and imbalance between legs. Y Balance Test (YBT) and ankle dorsiflexion mobility were also assessed. ANOVA was used for between-group differences analysis. Likewise, the impact of hip strength on balance and ankle mobility was analyzed using Pearson's correlation coefficient. A linear regression model for dependent variables was created with all variables that exhibited significant correlations. A between-group comparison analysis for the three competition age subgroups (U14, U16, U18) revealed non-significant differences ($p > 0.005$) for the hip strength variables except for hip ABD strength. The correlation study showed low-moderate effect sizes for hip ABD (in both the contralateral and homolateral limb) and AD strength (only the homolateral limb) with YBT and ankle dorsiflexion. However, when performing a regression model, only right hip ABD significantly predicted right limb YBT scores (beta = 0.592, $p = 0.048$). The present study indicated that, although both hip ABD and AD strength correlate with balance and ankle mobility with low-moderate effect sizes, only hip ABD strength was found to significantly predict YBT scores. Therefore, the potential role of hip ABD strength in particular, but also hip AD strength, for monitoring and enhancing balance and ankle mobility outcomes, should be taken into consideration when designing and implementing preventive strategies for lower-limb injuries.

Cerebral Cortex Changes in Basketball Players.

Kim JH, Park JW, Tae WS, Rhyu IJ
Journal of Korean Medical Science. 37(11):e86, 2022 Mar 21.

BACKGROUND: Plastic changes to brain structure and function have been reported in elite athletes of various sports. Interestingly, different regions of the brain were engaged according to the type of sports analyzed. Our laboratory reported no difference in total cerebellar volume of basketball players compared to that in the control group using the manual segmentation method. Further detailed analyses showed that elite basketball players had increased volume of the striatum and vermian lobules VI-VII of the cerebellum. We analyzed the brain magnetic resonance imaging (MRI) of basketball players to understand their cerebral cortical plasticity through automatic analysis tools for MRI.

METHODS: Brain MRI data were collected from 19 male university basketball players and 20 age-, sex-, and height-matched control groups. In order to understand the changes in the cerebral cortices of basketball players, we employed automated MRI brain analysis techniques, including voxel-based morphometry (VBM) and surface-based morphometry (SBM).
RESULTS: VBM showed increased gray and white matter volume in both precentral gyri, paracentral lobules and increased gray matter volume in the right anterior superior temporal gyrus. SBM revealed a left dominant increase in both pericentral gyri. Fractal dimensional analysis showed an increase in the area of both precentral gyri, the left subcallosal gyrus, and the right posterior cingulate gyrus. These results suggest a significant role not only for the primary motor cortex, but also for the cingulate gyrus during basketball.
CONCLUSION: Plastic changes of both precentral gyri, the pericentral area, paracentral lobules, and the right superior temporal gyrus were observed in elite basketball players. There was a strong increase of fractal complexity in both precentral gyri and a weak increase in the right posterior cingulate gyrus and left collateral gyrus. In this study, plastic regions linked to functional neuroanatomy were related to the competence required to play basketball.

Epidemiology and injury trends in the National Basketball Association: Pre- and per-COVID-19 (2017-2021).

Torres-Ronda L, Gamez I, Robertson S, Fernandez J
PLoS ONE [Electronic Resource]. 17(2):e0263354, 2022.

PURPOSE: The aim this study was to provide an epidemiological injury analysis of the National Basketball Association, detailing aspects such as frequency rate, characteristics and impact on performance (missed games), including COVID-19 related and non-related injuries.
METHODS: A retrospective study was conducted from the 2017-18 to 2020-2021 season. Publicly available records from the official website of the National Basketball Association were collected, including player's profiling data, minutes played per game until the injury occurred, unique injuries and injury description [location (body area), diagnosis (or mechanism)], and missed games due to injury.
RESULTS: A total of 625 players and 3543 unique injuries were registered during the period analyzed. There was an increased incidence of missed games and unique injuries ratios, from 2017-18 until 2020-21, even when excluding COVID-19 related cases. The main body areas of injuries corresponded to lower body injuries, specifically knee, ankle and foot. The tendon/ligament group, for both games missed and unique injuries, showed the higher ratios (1.16 and 0.21, respectively), followed by muscle (0.69 and 0.16, respectively) and bones (0.30 and 0.03, respectively). Irrespective of season, the higher percentage of unique injuries occurred in the group of players playing in the 26-35 minutes, followed by the 16-25 minutes played. Guards showed the highest injury ratios compared to other playing positions. Most injuries and missed games due to injury occurred from mid-season to the end of the regular season. The majority of both injuries and missed games were concentrated in the two central experience groups (from 6 to 15 years).
CONCLUSIONS: Despite previous efforts to better understand injury risk factors, there has been an increase in unique injuries and missed games. The distribution by body area, type of injury, when they occurred, minutes played and outcomes by play position, age a or years of experience vary between season and franchises.

LET'S CHAT ABOUT…

Let us know what is on your mind, what you want to chat about in the next issue of the FAST BREAK. Email to mwesner@ualberta.ca.

In this issue of Fast Break, Dr. Andrew Pipe, Chair FIBA TUE Committee, chats about Therapeutic Use Exemptions.

Let's Chat about TUEs

Andrew Pipe, CM, MD, Dip Sport Med
Chair, FIBA TUE COmmittee

It's important for all physician involved in caring for athletes to be very familiar with the need for, and the processes surrounding, Therapeutic Use Exemptions (TUEs).

TUEs are intended to ensure that otherwise prohibited substances (described in the WADA Prohibited list)can be used for the treatment of illness, injury or established medical conditions.

Team Physicians should be familiar with the WADA Prohibited List (updated annually) which can be downloaded from the WADA Website.
https://www.wada-ama.org/sites/default/files/resources/files/2022list_final_en.pdf

Unfortunately, WADA has not prepared an app which might easily be stored on a smart phone – I find it very useful to use both of the following apps which can be downloaded from the App Store:

- "Tennis Anti-Doping Programme" (very useful for rapid access to the WADA List)
- "Medi-Check Global Dro" (very useful for understanding whether a particular drug or substance is prohibited in a particular sport).

It's also important to note that only those players participating in International Competition require a TUE from FIBA. Players competing in domestic or other national settings should apply to the National Anti-Doping Organization(NADO) for a TUE. If a player begins competition with a national team and already has a TUE from a NADO, an application can be made for recognition of that TUE. If in any doubt:

- Apply to FIBA for a TUE. The FIBA website has very clear information and instructions regarding the TUE process. https://www.fiba.basketball/anti-doping/tue
- Contact fiba at: maildoping@fiba.basketball for further instructions, to download a TUE form, and details regarding its completion and submission.

When submitting a TUE application, ensure that the form is completed correctly, is submitted using either English or French, contains an appropriate, concise clinical summary, and copies of all relevant investigations or background clinical documents. Important, as well, to make sure the application is signed by both the physician and player! Much time is wasted seeking clarification of incomplete (or illegible!) information and you can ensure a timely, rapid response to an application by paying careful attention to the preparation of the TUE form.

In circumstances where emergency treatment is required (e.g. an allergic reaction requiring systemic administration of glucocorticoids) or it was not possible to submit a TUE before treatment was commenced (e.g. a recently diagnosed diabetic in whom insulin treatment was

immediately begun) then a 'Retroactive Application' can be submitted. In this case be sure to indicate at the appropriate site on the TUE form that this is a 'Retroactive Application' and be sure to identify why a retroactive application is being made. Once again, failure to complete the form appropriately can cause unfortunate and unnecessary delays.

Once an application has been received it is forwarded to members of the FIBA TUE Committee – a group of physicians experienced in sport medicine and familiar with the care of basketball players – for their review and, if appropriate, approval. Typically reviews are commenced very quickly after the receipt of a correctly prepared and appropriately supported application.

The criteria for granting a TUE and the processes by which applications can be received and reviewed are clearly stated in the WADA International Standard for TUEs which can be found at: https://www.wada-ama.org/en/resources/world-anti-doping-program/international-standard-therapeutic-use-exemptions-istue

Team physicians should be particularly aware of the need to check whether players under their care are taking, or require, medications for which a TUE is required and ensure that TUE applications are submitted in a timely manner.

All of this may sound complicated, but it can be straightforward if the information is properly assembled, and the form appropriately completed.

Ten quick hints:

1. Review the medications that players under your care are taking.
2. Check to see the use of any medication requires a TUE.
3. Ask the player if they have a TUE. If so, from whom? When does it expire?
4. As appropriate, submit a TUE application to FIBA .
5. Ensure that the TUE form is completed and legible.
6. Ensure that a concise clinical summary is attached.
7. Ensure that relevant clinical documents (e.g., lab results, X-Ray reports, consultant's letters) are attached.
8. Check that any documents not in English or French have been translated before being attached.
9. Anticipate the need for TUEs well in advance of competitions or tournaments.
10. We are here to help. Contact us at: maildoping@fiba.basketball

FROM THIS HISTORY BOOKS

On March 2, 1962, Philadelphia center Wilt Chamberlain became the first and only player to date to score 100 points in one game. The final score Philadelphia 169, New York 147. That is the most one player has ever scored in one game.

SHARE YOUR PHOTOS

Please send us your funny, interesting, or remarkable basketball pictures that we can share with the medical and sport science basketball community.

Photo caption: Wheelchair 3x3 made its debut at the Commonwealth Games in Birmingham, England, July 29-Aug 2, 2022.

THE STUDENT'S CORNER

This space is intended for sport science and medical students, residents, and fellows to contribute to our knowledge and conversation.

Please encourage your students to contribute to the Fast Break on a topic of their choosing related to basketball injury, rehabilitation or sport science.

Popliteus Tendinopathy: Small Muscle, Big Problem

By Alexander De La Rosa-Cabral, MD and Gustavo Lamela Domenech, MD; Physical Medicine and Rehabilitation Residents, VA Caribbean Healthcare System, San Juan Puerto Rico

What is Popliteus tendinopathy? Introduction:

Posterior calf injuries occur in both recreational and competitive athletes during sudden movements such as sprinting and decelerating, which are common movements in basketball. Popliteus tendinopathy, also known as popliteus muscle strain, popliteus tendonitis or tenosynovitis, is an example of this type of injury. This condition is a rare cause of pain on the posterolateral side of the knee. It is poorly understood and commonly misdiagnosed as a cartilage or ligament injury.

What Anatomy is Involved? Anatomy:

The popliteus is a flat triangular muscle that resides at the deep posterior compartment of the leg. The popliteus tendon originates from a depression on the outer side of the lateral condyle of the femur, anteroinferior to the proximal attachment of the lateral collateral ligament. It then passes through a depression on the outer side of the lateral condyle of the femur, passes posteromedial, and forms a muscle across the back of the knee to insert into the proximal tibia. The popliteus tendon is considered intracapsular, but extra-articular and extra-synovial.

This muscle is a major stabilizer of the posterolateral knee, and its function depends on its weight-bearing state. In the non-weight-bearing state, it performs internal rotation of the tibia. When weight-bearing, the popliteus muscle allows flexion and lateral rotation of the femur on the tibia allowing the knee to flex when it is in full extension. Therefore, it is known as the key to "unlock" the knee.

How does it happen? Mechanism of Injury:

Popliteus tendinopathy is caused by overuse of the popliteus muscle-tendon unit. It most commonly occurs in athletes that perform downhill sports and in runners who compete on hills or uneven surfaces. It may also be seen in athletes that have to sprint and decelerate, as this muscle avoids forward translation of the knee and excessive tibial rotation. Other causes are either a direct varus force (lateral), while the tibia is externally rotated, or a sudden force during knee hyperextension with the tibia internally rotated. It may also be associated with hyper-pronation of the foot since this causes an external rotation of the tibia. Poor dynamic stability and muscle weakness on the lower extremity can increase the risk of an injury during training.

How does it feel? Symptoms:

The patient complains of acute pain that occurs at the posterolateral part of the knee joint accompanied with localized swelling, redness and marked tenderness over lateral knee, at the insertion of the popliteus tendon. Crepitation of the knee joint can also be detected. Pain can be

reproduced with resisted knee flexion (15-30°) and tibial internal rotation. The patient tends to avoid full knee extension, as the initiation of flexion causes pain. Symptoms are exacerbated with downhill running or walking.

How can we diagnose it? Diagnosis:

History and physical examination are essential to the diagnosis of popliteus tendinopathy because it is primarily a clinical diagnosis. The condition should be suspected in an athlete with posterolateral knee pain that is exacerbated with downhill activities. The Garrick test can be used to confirm the diagnosis (*Image 1*). In this maneuver, the patient lies supine with hip and knee flexed to 90°. The examiner externally rotates the lower leg while the patient resists the movement. A positive test occurs if the pain is reproduced during the maneuver in the over the popliteus tendon or muscle.

Image 1: Garrick Test.
A: Patient lies supine with hip and knee at 90^0 B: Examiner actively externally rotates the tibia as the patient resists with internal rotation. ----► Arrows with a dashed tail represent the direction of motion of the patient. ◄— Arrows with a solid tail represent the direction of motion of the examiner.

Images are not required to establish the diagnosis; however, Magnetic Resonance Imaging (MRI) has the highest diagnostic yield. It is imperative to correctly diagnose as misdiagnosis may lead to unnecessary surgeries. Other conditions that can cause similar symptoms include osteochondritis, popliteal cyst, and Iliotibial band syndrome.

How is it treated? Management:

The management for popliteus tendinopathy is conservative. As with other musculoskeletal injuries, initial recommendations include Protection, Optimal Loading, Ice, Compression, and Elevation (POLICE). Non-steroidal anti-inflammatory drugs (NSAIDs) are the first choice of medication for this pathology. When the lesion is stable, lower extremity stretching and strengthening exercises can be started, focusing on eccentric strengthening (closed kinetic chain) of the quadriceps.

If initial conservative management fails, oral or injected corticosteroids can be considered, even though efficacy has not been proven in clinical studies. If steroids are being injected, the recommendation is an ultrasound-guided procedure for better localization (*Image 2*). Taping is another technique that has been used for this condition, but once again there is no research to

support its use. If conservative management fails and pain persists for more than six months, tendon sheath removal surgery can be considered.

Image 2: Ultrasound image of Popliteus Tendon.
The transducer is longitudinally at the posterolateral right knee, located between the femur and tibial bone. *LM*, Lateral Meniscus; *ITB*, Iliotibial Band; *PT*, Popliteus Tendon; *Femur*, distal Femur bone; *Tibia*, proximal Tibia bone. Courtesy of David Soto-Quijano MD, Physical Medicine and Rehabilitation Program Director at VA Caribbean Healthcare System.

Return to play:

The general recommendation is to start running when the knee is pain-free, gradually increasing the workload on the lower extremity to avoid re-injury or chronic complications. Physical activity may be re-introduced by running on flat surfaces such as a treadmill. Cycling also provides a good exercise alternative during the reconditioning phase. Strenuous workouts and downhill running are usually avoided for at least 6 weeks.

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