INTERNATIONAL SPORTS MEDICINE CONFERENCE

August 03 – 13, 2016
Rio de Janeiro

Congress Report
In connection with the Summer Olympics, the Second International Sports Medicine Conference took place in Rio de Janeiro from August 03 to 13, 2016. Experts from the field of orthopedics and sports medicine came together for the conference to present and discuss relevant current issues of sports medicine, taking advantage of the opportunity to gain direct insights into the work of the international top physicians, physiotherapists and orthopedists taking care of the Olympic athletes’ medical needs. At the invitation of the organizer, Bauerfeind, the International Sports Medicine Conference took place close to the Olympic training and competition sites in the renowned rehabilitation center Associação Brasileira Beneficente de Reabilitação (ABBR). The international presenters included doctors, physiotherapists and orthopedists with many years of experience in orthopedics and traumatology in connection with sports. The conference focused on international work with top athletes as well as amateur athletes and patients, and provided discussions regarding the current state of prevention and rehabilitation of sports injuries and syndromes resulting from physical strain. This resulted in valuable interchanges about current findings and experiences regarding injury mechanisms and the entire treatment chain – starting directly on the field with the immediate treatment of the athletes in competitions up to the sometimes long subsequent rehabilitation process.

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At the beginning of the scientific program of the International Sports Medicine Conference, Dr. Stefan Klima, Leipzig University, Germany, gave an overview of relevant general aspects of the health care system in Germany and thereby opened an animated discussion about differences between the health care systems in the participants’ different countries. At the end of his presentation Dr. de Bem completed the impressive insight into the work of the ABBR.

Dr. Robson de Bem from the renowned ABBR, Rio de Janeiro, Brazil, informed the participants about the history and the current work of the center – the special venue where the conference took place. In the 1950s, a poliomyelitis outbreak occurred in Brazil, which left thousands of children with sequelae. At that time, there were no rehabilitation centers in Brazil. Thus, a group of physicians and citizens founded the ABBR in 1954, in particular Fernando Lemos, an architect whose only son, Jose Maria Lemos, had been affected by polio; Dr. Oswaldo Pinheiro Campos, a specialist in poliomyelitis; and Percy Murray, who had suffered a severe spinal injury that left him paraplegic and who became the first president of the ABBR. In 1956, the ABBR founded the first rehabilitation school. Dr. de Bem reported that the researcher who developed the oral vaccine against polio, Albert Sabin, came to visit the ABBR in 1963, expressing his admiration for the work of the ABBR. Today, the ABBR is still a private, civil, non-profit association, and in addition a center of excellence in the state of Rio de Janeiro. It was awarded the National Human Rights Prize in 1999, amongst others. It now has two large areas – a rehabilitation center and an orthopedic facility. The rehabilitation center comprises the six units:

1. child and youth unit,
2. cerebral vascular and head trauma unit,
3. amputee rehabilitation unit,
4. spinal cord unit,
5. neuromuscular diseases unit, and
6. physical medicine and rehabilitation unit.

The center cares for children, adolescents, adults and senior citizens disabled due to job-related and traffic-related accidents, urban violence, and congenital, chronic or occupational diseases – on average 1,600 children and 8,000 adults per year. About 60% of their health care services inure to the benefit of low income patients from public health care facilities. The center treats minor and major injuries and also serves private health insurance companies and individuals. The exercise and sports medicine center has great experience in treating athletes and sports injuries. The orthopedic facility works in close conjunction with the rehabilitation center. It manufactures orthoses and prostheses for the upper and lower limbs as well as orthopedic footwear and soles for patients of all ages. It also provides mobility aids, such as wheelchairs and walkers. With statistical details of care services and patients’ characteristics forming the end of presentation, Dr. de Bem completed the impressive insight into the work of the ABBR.
CLOSE TO OLYMPIA

Most frequent injuries during the Olympic Games – experiences from the last games

Jörg Ritzerfeld from Bauerfeind, Germany, gave a short review of Bauerfeind’s history with the Olympics at the beginning of his presentation, which had been prepared in collaboration with Melf Sönnichsen. In the 1980s, with the development of the GenuTrain, many athletes as well as their doctors and physiotherapists used supports from Bauerfeind, such as the GenuTrain, for recovery, rehabilitation, and for their sports. This was the start of Bauerfeind’s active involvement in sport, which has increased ever since. In 2001, Bauerfeind became partner of the German Olympic team, providing the German athletes with services and supports during the Olympic Games in Salt Lake City 2002, Athens 2004, Turin 2006, and Beijing 2008. On the Olympic Games in Vancouver, Bauerfeind request of the chief medical officer of the team, providing the German athletes with services and supports during the Olympic Games. The majority were supplied with supports and orthoses. In terms of the types of injuries for which services were provided, the most frequently occurring injuries were meniscus injuries (23), spinal injuries (22), sprained ligaments (15), over-tensioning (11), ligament ruptures (8), and aneurysm (6) in the period before the Olympic Games started. During the Olympic Games, the spectrum of the most frequently occurring injuries was only slightly different with meniscus injuries (50; 12.5%), spinal injuries (38; 9.6%), sprained ligaments (31; 7.8%), over-tensioning (23; 6.4%), ligament rupture (13; 3.2%), and muscle cramps (13; 3.4%). The knee bandage GenuTrain was by far the most frequently applied support. Athletes utilizing the service came from nations all over the world, with the largest proportion from Brazil, which also had a large team involved in the Olympic Games. Regarding the types of sports the athletes were performing, two weeks before the Olympic Games most athletes utilizing the service performed handball (28), athletics (17), rugby (14), shooting (13), artistic gymnastics (12), and sailing (12). During the Olympic Games, most athletes utilizing the service performed athletics (74; 18.4.5%), handball (50; 12.4.7%), volleyball (44; 19.9.7%), swimming (28; 6.9.8%), and shooting.

Sports physical therapy for professional athletes competing for multiple days

From his perspective of having been a professional dancer for more than 10 years and now being a practitioner, Wolfgang Pachatz, Vienna, Austria, reported on the special issue of sports physical therapy for professional athletes competing for multiple days. He emphasized the good collaboration within the team including doctor, physical therapist, athletic trainer, massage therapist, etc. for a good outcome. Furthermore, he stressed how particularly the athletes performing in the Olympics have prepared their whole life for this very moment. Thus, in case of an injury, the athletes should be treated with a level of care that takes their particular situation and feelings into account. For the acute care, Mr. Pachatz illustrated the RICE procedure: rest, ice, compression, elevation. The next appropriate procedure has to be clarified, e.g. clinical, tapping, bracing, rest, end of the competition. 7 In phase I of sports physical therapy during the competition, the patient has to be calmed down from the extreme stress situation and then motivated and supported to cope with the situation, as Mr. Pachatz depicted. In phase II hands-on techniques are applied, e.g. soft tissue technique, manual therapy, muscle energy technique, fascial technique (FDT, 3… and physical interventions. If the range of motion, muscles, tissues, and reactions are in an appropriate condition, stabilizing and neuromuscular exercises can be applied in phase III. Strength training (e.g. closed and open kinetic chain) follows in phase IV before the potential return to the competition. Mr. Pachatz explained that pain is a major problem for the treatment and depicted potential consequences of pain. It can inhibit muscle activity and function and change muscle recruitment patterns and strategies for motor control, whereas altered recruitment patterns can possibly persist after pain. As pain can influence the neuromuscular reeducation, strength, endurance, and the psychosomatic basis, it can also impede the treatment of the athlete. Thus, medical treatment is possibly needed at first to enable the patient to undergo physical therapy. Furthermore, healing processes need time. Concerning the regular tissue recovery times, Mr. Pachatz illustrated that there is an inflammatory phase (3 – 5 days), a repair phase (5 days – 8 weeks), and a remodeling phase (8 weeks – 1 year). These time frames, however, are not available to athletes during competitions, which is why they need fast solutions. Mr. Pachatz discussed examples of possible physical therapy interventions, including stretching, taping, core control (myofascial chains), and neuromuscular reeducation (neuromuscular system, four principles in re-establishing sensory-motor control, reactive neuromuscular training). The four principles in re-establishing sensory-motor control are:

1. dynamic stabilization of single joints (co-activation of agonists and antagonists),
2. neuromuscular training of single joints,
3. reactive neuromuscular training (stimulate reflex activity, quick changes in joint positions, unsteady support surface), and

At the end of his presentation, Mr. Pachatz performed several demonstrations of neuromuscular training, including active involvement of the participants.
Judo injuries – options and limits of treatment with supports and orthoses

Dr. Anke Yacoub, Leipzig, Germany, started her presentation with an introduction to the background of judo. Judo has been an Olympic discipline for men since 1964, and for women since 1992. The basic goal of this martial art is to get the opponent out of balance using the law of lever. This type of sport is divided into multiple weight divisions and various ‘Dans’ or degrees of education levels. In Germany, there are currently about 200,000 active judokas. The basic techniques of judo are falling exercises, throws (about 48), grappling, joint manipulation and choker. This has to be considered regarding the causes of injuries in correlation with the specificity of judo.

Localization, type and occasion of injuries in judo depend on various influencing factors, such as the age of the judoka, the degree of judo education, the weight division and when the injury occurred – during training, a course or competition. Thus, varying results have been observed in several studies. A survey of 324 judokas examined the type of injuries incurred and most frequently the localization, type and occasion of injuries. A survey of 324 judokas examined the most common injuries and most frequent types of injury bruise, sprains, strains and contusions of the knee, shoulder and fingers. Being thrown was the most common injury-provoking mechanism. Severe injuries were quite rare and usually affected brain and spine. Chronic injuries typically affected finger joints, the lower back and ears.

At the end of her presentation, Dr. Yacoub reported the results of a personal survey from the greatest European training camp in Mittersil, Austria, in January 2016, including 179 judokas (30% female, 70% male) with an average age of 24 years. 63% of the judokas were 5, 6 or 7 years old when they started judo training and their average hours of training per week were 3.8 hours. More than 50% of the judokas had 1 – 4 injuries during their judo career so far and about 30% had 5 – 9 injuries. 66% were between 15 and 19 years old at the time of injury. At 78%, the majority of the judokas interviewed were not professionals. Fewer injuries occurred the greater the degree of judo training. About 95% of injuries happened during a throw. A detailed analysis of the type of throw that was the cause of an injury most frequently revealed the hip throws Uchi Mata, Seoi Nage, Tai Otoshi, Harai Goshi and Tai Guruma.

The most frequently reported injuries were sprains, strains and contusions of the knee, shoulder and fingers. Being thrown was the most common injury-provoking mechanism. Severe injuries were quite rare and usually affected brain and spine. Chronic injuries typically affected finger joints, the lower back and ears.

As a conclusion, Dr. Yacoub explained that injury prevention can be improved by providing education for athletes, coaches and referees and by establishing minimum standards of qualification and experience for trainers and referees. As the average age of injury lies between 15 – 19 years, there should be a focus on better prophylactic medical care in judo for children (including coaches). The use of supports in judo can be effective during intensive rehabilitation and for early proprioceptive training.

Dr. Yacoub presented several options for the prevention of injuries, such as intensive warming up, all-round education, falling exercises, supports and proprioceptive training. For strength and stabilization training, support with preventive function for ankle instability for early proprioceptive training can be applied. Furthermore, a specific program for ACL injury prevention with proprioceptive exercises and conveying knowledge of risk situations under the use of bandages is a preventive option.

Case study of a rare severe injury during a judo competition

In the interesting cases section, Dr. Anke Yacoub, Leipzig, Germany, presented the case study of a rare severe injury during a judo competition. Dennis H., male, European champion U 17, weight division 100 kg, being 19 years old at that time, had already won 3 fights in the ranking list tournament in Esslingen on May 31, 2008, when he was in the final fight for this weight category. After about 2 minutes of fighting, Dennis wanted to throw his opponent with a throw called Tae Guruma (which is now forbidden after a change of the rules). But in a combination of factors, such as speed and power of the throw, his body weight (100 kg) plus about the same body weight of his opponent, the swing was too powerful and Dennis landed with the opponent on his back on his own head. He lay on the mat and immediately had pain in the cervical spinal column. Competition doctors only took a quick, general look and asked him to stand up again. So he tried to stand up, but was not able to lean on his right arm and therefore fell back down on the mat. An ambulance was immediately called and a neck brace was applied for transport. On arrival at the clinic in Esslingen, X-rays and MRI were performed that revealed a fracture of the 5th corpus of the cervical spine. The doctor at duty drew the conclusion that it was a simple fracture and should be operated on Monday, when the respective surgeon was available. However, it should be noted that since arrival at the clinic, the patient had par- and hypoesthesia of the thumb, a slight loss of motoric abilities and had not received any drugs against pain. After consultation with his mother and Prof. Dr. med. Heyde (now head of the Department of Orthopedics at the University of Leipzig), a transfer with an airplane to the Benjamin Franklin Hospital Charité Berlin was organized. There, the patient was operated on June 2, 2008. Intraoperative, the real dimension of the injuries was revealed showing complete destruction of the intervertebral discs C4/5 and C5/6. The corpus of C5 was destroyed completely and had to be removed and replaced by a cage filled with the residual bone of the corpus. Immediately after the operation, a complete regression of the neurological symptoms could be observed. The patient remained at the hospital in Berlin for 18 days and was provided with a neck brace for 4 weeks. Afterwards, the patient started a condition training through cycling with protection of the cervical spine. During 4 weeks, the patient showed a weight loss of 9 kg. In total, he underwent 6 months of rehabilitation in the Olympic Center in Leipzig. The patient has completely recovered, but the injury meant the end of his sports career. He received psychological treatment and is now studying to become a PE teacher at the DHPK Leipzig (University of Sports) and is a judo instructor for children and U 18. Retrospective analyses revealed the cause of the injury: the initial development of tension by both fighters at the start of the throw went over into an abrupt loss of tension by the opponent as he suddenly felt that he didn’t have the power to hold up to the force. Subsequently, Dennis lost his balance, resulting in an uncontrollable immersion of his head onto the mat. This is a case example of an extremely rare injury in judo.
Clinical reasoning in the use (and non-use) of supports and orthoses in postoperative and conservative rehabilitation – functional screening and testing procedures on athletes and patients and the underlying clinical reasoning

As one reason for the screening concerning the potential application of supports and orthoses, Karsten Høgh, Hadsten, Denmark, listed the high demands from patients living an active way of life and the high expectations of rehabilitation. For example, many elderly people still like to perform sports, whereupon supports and orthoses can provide aid. Concerning athletes, there are e.g. high load demands in pivoting activities/sports which increase the risk of injury and reinjury and in which supports and orthoses can provide stability and protection. In Denmark, conservative rehabilitation is preferred treatment, both concerning costs and outcome, as Mr. Høgh pointed out. He explained that in most cases, surgery seems to be recommendable to avoid, but is highly relevant in specific cases to achieve the best results both in the short term and long term. As a conclusion, screening regarding the use (and non-use) of supports and orthoses should be performed to optimize conservative and post-surgical rehabilitation and to prevent reinjuries and secondary arthritis.

Mr. Høgh exemplified cases in which screenings for effects should be considered for the decision whether to apply supports and orthoses, divided into ‘acute/subacute’ and ‘chronic’ cases. Acute/subacute cases included meniscus lesions without impingement (in cases of blocked knee, functional testing is not possible), patellar luxations/subluxations, anterior cruciate ligament (ACL)/posterior cruciate ligament (PCL) injury, total/partial ruptures, injuries of cartilage or bone bruise, and applications for neurological rehabilitation (first and second neuron) – such as screening with and without GenuTrain as this knee bandage can enhance the proprioception. Chronic cases included arthritis grades 1 – 3 (grade 4 most often needs surgery), ACL/PCL injuries (older conservative cases/post-surgical), old meniscus injury, hypermobility, functional instability (valgus/varus/rotation), and preventive application.

With regard to possible screenings in the context of knee rehabilitation, Mr. Høgh presented an overview of rehabilitation steps and reasonable time points where screenings for the use of respective orthoses/supports or insoles are to be considered. At the time of injury, e.g. in case of a meniscus or ACL injury, considering the use of a SecuTec Genu or similar hard-frame orthosis for protection is appropriate. After a period of tissue-controlling and respecting healing, progressive mobilization and specific strength training should follow. In the following steps of the rehabilitation, such as functional exercises and lower extremity training, hip and core, screening for several other supports is applicable, e.g. for a functional 4-point orthosis like SofTec Genu. In addition, concerning increasing loading factor and challenging dynamic stability, the screening for the need and effect of orthoses or supports, e.g. GenuTrain, is useful. Finally, in the back-to-sport or –activity testing, the specific movement patterns are examined and the need for compression support or the need for protection and prophylaxis is considered.

Mr. Høgh gave an overview of the screening concept consisting of manual testing of joint mobility and muscle length/tonus, manual muscle strength tests, and specific muscle-synergies testing, as well as functional screening with key exercises and monitoring quality of movement/strategies. The evaluation of the tests examines the effects, combined with the clinical reasoning on the need for the orthoses/support. For this, the products should be available in the clinic. The test can therefore be performed with and without the product to evaluate the potential benefit. Mr. Høgh explicated parameters for the evaluation screening, of which at least one should be monitored when determining positive effects with an orthosis or support:

1. Decreased or no pain (subjective pain report),
2. Quality of movement, e.g. less valgus, fewer rotational forces, better alignment, less visual instability,
3. Increased performance (higher load, increased endurance, managing progressive exercises),
4. Patient reported feeling of better control, security or comfort, and
5. Less or no inflammatory response after each exercise and the overall testing procedure.

In summary, Mr. Høgh discussed several aspects for and against the application of supports or orthoses that should be considered in relation to the case for the potential recommendation to use a product. Potential advantages of orthoses and supports includes the optimization of the timeline and outcome of conservative and post-surgical rehabilitation. As Mr. Høgh explicated, it should also be considered that long-term effects or possible adaptation effects of wearing a support are often not yet known. As a last counterpoint, he listed that the cost of a support must often be paid by the patient. In general, it is crucial to guide patients in terms of when and how to use the support/orthosis correctly, as Mr. Høgh explained.
Returning to sport after elbow injuries – the effect of orthoses and bandages

Prof. Dr. Christoph Josten, Leipzig, Germany, started his presentation with an exemplary case, showing how dramatically a so-called ‘simple’ elbow instability can end. A 51-year-old patient with a Mason IV fracture developed a severe ankylosis 2 years after he had undergone primary stabilization, and thus a posttraumatic arthrosis occurred after a ‘simple’ dislocation. Prof. Josten explained the special positioning and function of the elbow as a key factor of positioning the hand in space. In complete extension of the elbow, it is impossible to reach your own head or the region around it, for example. Thus, the flexion of the elbow is essential for the ability to perform many motions of daily life, such as putting food in your mouth or putting on glasses or hearing aids if applicable. The required range of motion of the elbow for daily functioning is 30° – 130° of flexion/extension and a 50° arc of pronation/supination. 1,2

Typical injuries are differentiated into soft tissue injuries (ligaments, muscles) or bone injuries as well as a combination of both. Concerning epicondylitis, Prof. Josten illustrated the ulnar collateral ligament (UCL) instability ‘throwers elbow’. First, he exemplified the high valgus stress which is present in throwing phases (44 Nm), tennis serves (67 Nm), and baseball throws (291 Nm) on the ulnar ligament. The UCL instability is caused by repetitive mechanical valgus stress (e.g. tennis, baseball, goalkeepers) which leads to a medial ‘joint opening’ of up to 20° and as further consequence to an impingement of the olecranon in the fossa olecrani. In cases of a ‘thrower’s elbow’, MRI should be performed for the identification of the lesions of the UCL. In consequence of the impingement, the athletes can experience e.g. dorsal pain, swelling, blockades, and deficient extension. As first treatment choice in most cases, Prof. Josten recommended the conservative rehabilitation. A study has shown that conservative rehabilitation with initial immobilization and NSAID in professional athletes resulted in a rate of 42% of patients with complete healing under the conservative therapy.3 There are various types of external application such as bandages, forearm straps/braces, splints, and orthoses. Bandages, such as the Epifrain, enclose the joint proximal and distal, protect to a certain degree against hyperextension, stimulate muscles and the change of the load application in the extensors, compression, and proprioception. In addition, Prof. Josten emphasized the positive psychological aspect of bandages. Indications for the application are e.g. postoperative/posttraumatic irritation, arthritis, epicondylitis, bursitis, chronic swelling, and strains/sprains. Forearm straps/braces apply pressure on the extensor muscle group, as Prof. Josten elucidated. Indications are epicondylitis and elbow pain due to overuse. Splints stabilize the elbow joint in arthrodesis position. Indications for their application are e.g. postoperative immobilization, rheumatic joint effusion, instability, and prevention of painful motions. Orthoses provide rigid material, load removal, immobilization or controlled mobilization, and stabilization. Indications include e.g. (partial) immobilization after operation (i.e. arthrolysis, stabilization, bandages, plastic or dislocation) and prevention of trauma after plexus lesion. Dislocations of the elbow are primary soft tissue injuries, Prof. Josten explained. They represent the second most common dislocation in adults after dislocations of the shoulder, nearly half of which occur in sports (incidence 6 – 13/100,000, 80 – 90% dorsoradial). Prof. Josten expounded that the knowledge of the different interactions of the ligaments has increased remarkably, especially on the radial side, which had been underestimated before. Currently, the state of knowledge is that chronic instability is more related to radial injuries than to ulnar injuries. Therapy options for the simple dislocation (without associated bone damage) are short immobilization (about one week), stability control, orthosis, and functional post-treatment. Prof. Josten depicted that after a dislocation of the elbow, an early functional treatment should be carried out. In addition, there is a high probability of arthrofibrosis with limited range of motion on long-term immobilization. Finally, he summarized that there exists a variety of elbow lesions with a tendency to permanent instability. Many lesions can be treated functionally and surgery should be indicated carefully. There has been a development of many new operative techniques in recent years. With the conclusion that bandages and orthoses play an important role in the therapy algorithm, Prof. Josten completed his presentation.

First, Dr. Kai Fehske, Würzburg, Germany gave a general introduction into the field of ankle injuries. Ankle injuries represent one third of all sports injuries. However, only 55% of athletes with ankle injuries consult a physician. There are no known sex differences with regard to ankle injuries. The risk of injury increases with the respective activity level. In the normal population, the risk of an ankle injury accounts for 6.2/1,000 person-years. A study investigating ankle injuries in the US Army even indicated 35/1,000 person-years. The majority of the athletes affected by ankle injuries (60 – 80%) were performing high-risk sports, such as (with decreasing risk) basketball, volleyball, soccer, gymnastics and American football.

In his presentation, Dr. Fehske showed several short films to demonstrate concrete situations as to how an ankle injury can happen e.g. twisting of the ankle or inappropriate mechanical stress. Furthermore, he presented the example of the professional soccer player Marco Reus (Germany) who – after a first ankle injury – had a history of several repeated injuries on the left ankle over several years. This also raised the question if the timing of returning to the field had been right or post-injury stress was yet too high.

With that, Dr. Fehske led over to the topic ‘return to play criteria’. As critical questions that the physician should ask, Dr. Fehske listed: ‘Should you play again at all?’, ‘In what kind of sports activities can you participate?’, ‘What is the actual performance of your injured ankle?’, ‘When can you play again?’ and ‘How often can you exercise?’. Dr. Fehske explained the crucial role of motivation in the process of a potential return to sport. Another aspect is the difference in possibilities provided by the healthcare system for non-professionals, which is restricted, and professionals. Professionals are provided with (almost) unlimited resources in cases of injury during their sports practice. Also, their motivation to return to their sport activities is usually very high. Potentially problematic factors can be pressure from e.g. the media, coach or family, and the involvement of (too) many therapists with different opinions.

A systematic review and meta-analysis examining intrinsic risk factors of lateral ankle sprain revealed an association of different factors, such as body mass index, slow eccentric inversion strength, fast concentric plantarflexion strength, passive inversion joint position sense, and the reaction time of the paroneous brevis with a significantly increased risk of lateral ankle sprain. 1 Dr. Fehske elucidated intrinsic risk factors, such as muscular imbalance, limited neuromuscular control, previous trauma, hindfoot varus, posterior placed fibula and potentiality the body mass index as factors that can be worked on. Extrinsic risk factors, such as surface, shoes, type of sport, player’s position and time of injury (beginning/end of competition) are difficult to be influenced while quality of warm-up and missing external stabilizer (tape, brace, etc.) are influenceable potentially positive factors.

Dr. Fehske described chronic ankle instability that are divided into functional instability (muscular deficit, proprioceptive deficit) and mechanical instability (ligament insufficiency after a relevant trauma). 2 Mechanical instabilities potentially require stabilization for the return to sports activities. Dr. Fehske presented a prospective study concerning the need for surgical stabilization and time to return to sports in stable and unstable grade II high ankle sprains. The study identified a positive squeeze test and injury to the anterior tibiofibular ligament and deltoid ligament as important factors in differentiating stable from dynamically unstable grade II injuries and to predict which athletes may benefit from early arthroscopic assessment and stabilization. 3 Additionally, Dr. Fehske reported that in a literature review two risk factors for lower extremity injury have been pointed out: previous injury and inadequate rehabilitation. 4

In his section about stage-adapted rehabilitation, Dr. Fehske stressed the importance of clarifying associated injuries as they may lead to a delay of return and continuing of symptoms, as he cited from the literature. 5 In general, an individualized rehabilitation and training is central. He presented several rehabilitation methods in detail, e.g. rehabilitation after anatomical ankle ligament repair or reconstruction. 6 As a further important aspect, he explained the potential positive influence of postoperative immobilization on tissue healing. Dr. Fehske summed up that rehabilitation should achieve an increase of lower extremity strength, range of motion, and strength of foot and ankle as well as an improvement of balance and proprioception. Accelerated rehabilitation leads to earlier activity, and multi-disciplinary approaches (also including nutrition) are needed, as well as clinical examination, subjective evaluation, and functional testing.

At the end of his presentation, Dr. Fehske explained several tests for the classification of the performance concerning the return-to-play ability, such as the star-excursion test or the single-leg drop landing test. Also, he reported on his own study which is currently in progress and is aiming to describe and evaluate functional testing to detect chronic ankle instability. Concluding, he summarized important aspects, e.g. that premature return to play leads to a higher risk of reinjury and prolonging rehabilitation.

Moreover, postoperative/post-traumatic time is not necessarily the determining factor and surgery should be considered if conservative treatment fails. A reproductive, easily applicable test standard could not be established yet, thus the baseline is still to be set.

Use of supports and orthoses to treat sports-specific injuries of the knee – aspects of regenerative medicine

Dr. William Murrell, Dubai, United Arab Emirates, reported on a study with the result that patients with ACL deficiency (ACLd) had diminished activation in several sensorimotor cortical areas and increased activation in three areas compared to controls. The conclusion of this study was that ACLd can cause reorganization of the central nervous system, suggesting that such an injury might be regarded as a neurophysiologic dysfunction, and not a simple peripheral musculoskeletal injury. As potential degenerative knee conditions, Dr. Murrell listed knee osteoarthritis, degenerative meniscal tears, chondromalacia, periostitis, bone edema, and chronic neuritis. He explained that the primary information that is important for the examination and diagnosis is the location of the pain and to combine this with information about whether there are mechanical symptoms. Furthermore, a Vitamin D deficiency – which is common – has an important impact on muscle function. In addition, palpation of pertinent anatomy, determination of possible laxity, and the presence of meniscal irritation can be important contributing factors to consider and can help with defining the underlying condition and ultimately the treatment. Plain radiography can also be very helpful, Dr. Murrell explained, to identify e.g. mechanical malalignments. In general, MRI does not define surgical lesions and the transition to surgical treatment should be carried out only after appropriate evaluation, despite time constraints currently found in modern orthopedic surgical practice.

In the second part of his presentation, Dr. Murrell reported on the application of knee supports such as the GenuTrain. He presented the results of the testing study performed in his own practice involving the GenuTrain and GenuTrain P3 Active Support. A good stabilizing as well as pain-reducing effect of the two supports was observed. More than 80% of patients reported a good to very good stabilizing effect of the GenuTrain and GenuTrain P3 Active Support. Furthermore, more than 80% of the patients evaluated reported satisfactory to very good reduction in pain with use of the knee support.

Dr. Murrell also described a case study from his own practice of a 29-year-old woman, with left anterior and medial knee pain, without history of trauma or injury. She was treated with leukocyte-poor, platelet-rich plasma (PRP) injections derived from her peripheral blood with high concentrations of platelets, platelet-derived growth factors, and bioactive proteins. Within a total follow-up of 30 months, a considerable improvement in the pain symptoms from baseline to 30 months was observed. This indicates that PRP injections can potentially serve as therapeutic intervention for treatment of pain associated with early onset of osteoarthritis, as the study reports. In addition, Dr. Murrell presented several further studies concerning potential good effects of PRP treatments in osteoarthritis of the knee. After reporting on several further procedures, he presented a current review with an overview about regenerative treatments to enhance orthopedic surgical outcome. At the end of his talk, Dr. Murrell introduced the Biologic Orthopedic Society (BiologicOrtho.com) as a group of professionals promoting the development of biologic treatments for musculoskeletal disorders.

LOWER EXTREMITIES AND KNEE INJURIES – AWAY FROM THE SURGERY

Rupture of ACL: surgical and follow-up treatment supported by orthoses and bandages

Dr. Dave Lee, Singapore, reported that ACL injuries are some of the most common injuries with yearly two million ACL injuries occurring worldwide and an incidence rate of 8/10 000 ACL injuries per 100 000 citizens. He explained that the ACL is the primary stabilizing structure of the knee, restraining the anterior translation of the tibia as well as the tibial internal rotation. There are some kinematic and kinetic gender differences, as Dr. Lee depicted. In comparison to males, females have:

1. reduced knee and hip flexion when landing,
2. increased knee valgus, internal rotation of femur as well as the tibial internal rotation. Women demonstrate a quadriceps dominant neuromuscular pattern and associated with that is an increased risk of ACL failure during landing. Men on the other hand show higher hamstring recruitment than women. Param- eters for the diagnosis of ACL injury are:
1. the case history (a ‘pop’, giving way, inability to keep playing and recurrent instability) and
2. the physical examination (Lachman, pivot shift, anterior drawer test).

By combining medical history and physical examination, the diagnostic accuracy exceeds 90%. Furthermore, with MRI concurrent inju- ries can be assessed, which occur to a large extent, especially concerning the meniscus. As Dr. Lee illustrated, the pivot shift test is the most specific clinical assessment of knee joint rotational laxity after a complete ACL tear. Its aim is to assess the degree of injury for the knee with ACLD. The goals in ACL management are to restore normal function, reduce symptoms, improve quality of life and minimize complications. Dr. Lee commented on three studies dealing with the question of whether surgery should be performed or not in cases of ACL ruptures. Firstly, there were two studies from Sweden in the 1980s, but these had limitations due to study design and practice guidelines. The third one was the Kanon Study, a randomized trial comparing a primary operated versus a conservatively treated group of moderate to high-level ath- letes with ACL injury.1 The primary outcome after 2 years showed that 40% of those in the conservatively treated group experienced discomfort and had to be operated on. 60% managed as well as the primary operated group. The conclusion of the study was that starting with rehabilitation alone, 40% of ACL reconstructions can be avoided without com- promising results. This conclusion was re- garded by many as invalid, Dr. Lee elucidated, as the patients that required meniscectomy dramatically increased in the non-operative group that subsequently underwent surgery. However, he argued that it is a legitimate point that not every patient needs surgery. He recommended ACL surgery for athletes and active persons with high knee functional demands involving cutting motions. He illus- trated that the Kanon trial indicated that 50% of non-elite individuals still need surgery. The choice of surgery should be individualized after a careful and open discussion between patient and surgeon. Concerning grafts, Dr. Lee explained various considerations when selecting a graft for a patient. Ideal graft characteristics include a reproduction of anatomy, biomechanics and stiffness of the native ACL, a rapid and complete biological incorporation, strong initial fixation and low or no morbidity from harvest to the patient. Dr. Lee opposed advantages and disadvan- tages of the bone-patellar tendon-bone autograft (BPTB) and hamstring graft and presented a study that came to the result that the hamstring graft was superior in knee stability and function (p = 0.001). Further- more, he reported on a study from the Magel- ian Society including surgeons from all over the world with an average treating rate of 130 (20–460) ACL surgeries per year, where a predominant use of the hamstring (58%) compared to the BTB (28%) was found.2 Dr. Lee depicted various graft fixation choices and presented results from a review compar- ing intratunnel versus extratunnel fixation of hamstring autograft for anterior cruciate ligament reconstruction. In this systematic review, no differences were found between the two groups, except that patients with intratunnel fixation were released earlier to continue sport activities due to higher con- fidence with the method among surgeons. A ‘normal’ ACL consists of an anteromedial (AM) bundle, which is more tight in flexion and a posterolateral (PL) bundle, which is more tight in extension, as Dr. Lee explained.

They function separately in variable angles of knee flexion and the PL bundle is important for rotational stability in extension. Dr. Lee illustrated the ‘anatomic’ ACL graft place- ment in which the graft is put down lower on the femur side to achieve better rotational control, and the double-bundle ACL recon- struction, which aims to reconstruct both ACL bundles. In the study from the Magellen Society cited above, the authors describe that 76% of surgeons practiced single-bundle ACL reconstructions only, 22% performed both single-bundle and double-bundle ACL reconstructions exclusively. A current study about risk factors associated with grade 3 pivot shift after acute ACL injuries indicated that for acute ACL injuries, the best set of predictors of grade 3 pivot shift were pivoting sports involvement at the time of inju- ry, abnormal lateral PITS, ACL disruptions, and combined lateral meniscal lesions and that these results may provide additional in- formation for counseling patients on residual laxity and risks for graft rupture after ACL reconstruc- tion.3

Dr. Lee presented his recommendation for return-to-sports criteria:
1. full pain-free range of motion,
2. restoration of normal gait,
3. no joint effusion, and
4. recovery of strength in the operated knee –>90% of the non-operated knee (leg state – as the return to sports depends not only on the physical readiness but also on the mental readiness (kinesiophobia)).4 A review of patients with a minimum 5-year follow-up that investigated the return to sports after anterior cruciate ligament reconstruction found that 62% of the patients returned to their previous level of sports and that fear of reinjury was an important factor for many patients not returning to sports.5 Dr. Lee explained that he uses the application of bracing (e.g. with the GenuTrain) after knee injuries as ‘braces’ allow collateralis to heal, and that the application of braces is often performed during 6 weeks before proceeding. Further reasons he expounded for the application of stabilizing braces after ACL reconstructions were that bracing controls range of motion, improves stability and confidence, and that it limits injuries with accidents. He reported on the application of the GenuTrain Active Support for ruptures of the ACL/PCL, me- niscus transplantation (and ACL), and insuf- ficiencies of the ACL/PCL, and the applica- tion of the SecuTec functional orthosis after ACL reconstruction. The overall outcome of the application of the braces/orthoses concerning pain reduction, stabilizing effect and evaluation of everyday activities was very good to very good, as Dr. Lee depicted.

Results from an American study showed a significant rise in the incidence of ACL reconstructions in the United States from 86,487 (95% CI, 51,844–121,530; 32.9 per 100,000 person-years) in 1994 to 129,836 (95% CI, 94,993–164,679; 43.5 per 100,000 person-years) in 2004 (p = 0.015), as Prof. Pécora expounded. Furthermore, the study revealed that the number of ACL reconstructions increased in patients younger than 20 years and those who were 40 years or older over this 12-year period. A further result was a significant increase of the incidence of ACL reconstructions in females from 10.36 to 18.06 per 100,000 person-years between 1994 and 2006 (p = 0.0003), compared to a much slighter increase in males, with an incidence of 22.58 per 100,000 person-years in 1994 and 25.42 per 100,000 person-years in 2006.1

With about 200,000 injuries per year in the US and around 100,000 ACL reconstructions per year, ACL reconstruction is one of the most commonly performed and researched orthopedic procedures, as Prof. Pécora elucidated with citations from the literature.2 From an economical point of view, he explained that ACL reconstruction is more cost-effective than non-operative treatment and that early single-bundle, single (endoscopic)-incision outpatient ACL reconstruction using either bone-patellar tendon-bone or hamstring autograft provides the greatest value.3 Another study came to the conclusion that early reconstruction should be the preferred treatment from the social health system perspective.4 Concerning the timing from a medical view, Prof. Pécora illuminated that a delay in surgery for more than 3 months was the strongest predictor for the development of a concomitant injury in a cohort of a study.5 As Prof. Pécora cited from another study, the close association between body mass index (BMI) and prevalence of associated lesions suggests that attention should be paid to patients with elevated BMI when considering the timing of ACL reconstruction surgery.6 He reported from a further study that because of a significantly higher rate of prognostically advantageous meniscal repair, the recommendation for an ACL reconstruction within 6 months after trauma was made to preserve the meniscus and reduce the risk of developing osteoarthritis.7

Prof. Pécora summarized that early reconstruction prevents the development of meniscal and chondral lesions with time and provides an opportunity to repair and save the meniscus. For athletes, he recommended placing the timing of the surgery as soon as possible to enable a fast return to sport, with a cautious questioning of potential risks. Concerning the question of how early a surgical treatment should be performed, Prof. Pécora reminded the audience that soon after the injury, hemarthrosis, swelling, bone bruise, and an inflammatory process in all the knee occurs, which leads to a loss in the range of motions and quadriceps strength. With the operation, an additional trauma is produced, causing more swelling and more pain, which certainly will provoke problems in rehabilitation. Quadriceps strength and full range of motion can serve as parameters for the indication of the surgery, as Prof. Pécora explicated, as they are closely linked to the inflammation. With decreasing inflammation, quadriceps strength and full range of motion can recover. He showed the results of a survey with 824 orthopedic surgeons from 2013–2014 in the US which came to the result that full knee extension was the only distinctly significant factor for surgical timing.

At the end of his presentation, Prof. Pécora expounded his personal recommendation to remEDIATE the hemorrhage, swelling, and inflammatory response to the ACL trauma and the concomitant loss of motion:

1. crutches/allow movements,
2. cryotherapy,
3. muscle strengthening, and

As an indicating timing parameter for surgery, he uses the time when the range of motion reaches 90 degrees of flexion.

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A current study indicates that the expectations for 12 of 19 items in connection with arthroplasty surgery were unfulfilled in > 30% of patients.11, reported Dr. Stefan Klima, Leipzig, Germany. He listed 3 problem groups concerning knee arthroplasty: early problems, mid-term problems and late problems. Early problems occur 2 – 3 years after surgery, when the patient experiences problems with the operated knee. Inflammation can be a problem and it can take a long time until the temperature at the operated site - that increased as a sign of inflammation – is normalized. Balancing is one of the most important problems in the early phase, but also later in the course of rehabilitation. Dr. Klima pointed out that concerning the surgical treatment, the preservation of the ACL and/or the PCL should be considered instead of sacrificing it, as with the loss of ACL and/or PCL – especially both – the patient also has a loss of proprioception which can lead to a decrease in walking abilities, e.g. in an unstable environment. Hence, new approaches to leave both ligaments preserved is in discussion and new implants are under development. Another early problem in rehabilitation that Dr. Klima addressed concerns the patellar tilt. There are possibilities to avoid a patellar tilt regarding the approach and the malrotation of the femoral component. In the case of the malrotation of the femoral component, however, there is only a small chance to solve the problems. One option is a release of the iliotibial tract, while a lateral release is very difficult, as Dr. Klima explained. A further early problem is stiffness, for which the same applies: If operative mistakes caused the problems, revision is difficult. One important mid-term problem is instability as a consequence of proprioceptive loss due to destruction of the control circuits of the proprioceptive neurons (as mentioned above concerning consequences of operative actions affecting ACL and/or PCL). Thus, the instability stems from the soft tissue release that can be necessary, as Dr. Klima argued, but discussions are currently underway about whether to accept a mild varus deformity instead and preserve the ligaments and that with the proprioception. Proprioception that is destroyed will never be completely recovered, but through intense physical therapy with muscle gain and support of orthoses, compensation for the instability is partly possible. Dr. Klima further explicated that rehabilitation needs accurate planning which consists of:

1. the initial examination concerning surgery (primary or revision?), implant?, previous surgeries?), issues besides diseases, activities before surgery, and the aim of rehabilitation,
2. the planning with regard to passive and active exercise programs, physical therapy, possibly orthoptics or psychological support, and training therapy.

For rehabilitation after total knee arthroplasty (TKA), Dr. Klima listed:
1. the passive mobilization and axis justice moving with EPM device, lymphatic drainage, positioning of the leg, and physical wound management,
2. active mobilization with exercise programs, device-supported physiotherapy, muscle groups, supportive activities such as progressive muscle training, and electrotherapy,
3. coordinative training with gait training, unstable base, training of reaction, and plyometric training (explosive strength).

Dr. Klima pointed out that early rehabilitation with catheters is comfortable for the patients due to pain reduction, but it is connected with potential disadvantages such as immobility, the risk of falling, the risk of decubital ulcers, intramuscular hema­tomas, and limited neurological response. Thus, active physiotherapy is preferable. As an alternative, he presented the short use of an intra-operative continuous intra-articular catheter which releases analgesics directly into the joint and has shown some advantages, e.g. significantly higher mechanical load on the artificial joint. It is also described that jogging, skiing, surfing, and ball sports are not recommended, as they include abrupt inaugural and braking maneuvers, thus can lead to a significantly higher mechanical load on the artificial joint. The sport is connected with low impact, low speed, and low contact. Requirements for practicing sport after TKA are sufficient mobility and stable anchorages. Concerning the soft tissue, stable and secure ligaments in extension, flexion and mid-flex position, sufficient muscular force, condition and coordination are preferable, but there are only limited possibilities to reverse consequences from operative mistakes. Surgeons should consider the physical activity and demands preoperatively and a close cooperation with physiotherapists should be ensured. Implantation failure can only be compensated by a very limited extent by training and supports, but supports are helpful to train proprioception. Also orthoses during early rehabilitation can compensate instability. Finally, Dr. Klima illustrated that patients should be educated about the long road to success and the limitations.

Rehabilitation after knee arthroplasty – preparation for physical activities

References:
The role of regenerative medicine in orthopedic knee OA – alternatives to surgery

Dr. Joseph Purita, Boca Raton, Florida, USA

Dr. Joseph Purita explained that there are different types of PRP and one problem with regard to the literature is that it is partly unclear which kind of PRP has been used in the respective studies. He depicted that neutrophils, monocyte macrophages, fibroblasts, endothelial cells, keratinocytes, CD 34+ stem cells and pluripotent small embryonic-like stem cells should be present in PRP. In the centrifugation process to gain PRP, erythrocytes are taken and mixed with a part of the plasma, hence PRP is gained. Mishra et al. defined 4 different types of PRP according to the characteristics of the content of white blood cells, the activation and the platelet concentration. Dr. Purita pointed out that another type of PRP should be added to this classification, the photo-activated PRP, as good effects with light treatment of PRP with special LED-light before the application of PRP have been found. He elucidated that light activation can be done with any type of PRP but best with increased white blood cells, whose activity is turned from inflammatory to anti-inflammatory. Concerning light activation, differently colored low-level lights have different effects on cells, e.g. blue light decreases proliferation of cells, whereas red and yellow light increases it. Dr. Purita illuminated that photo modulation seems to work on both PRP and stem cells and that we now have the new field of ‘photocellulars’, which are compounds produced by light activation. With regard to the activation of platelets, he also explained that tissue collagen is a strong activator of platelets. In the part of his presentation about stem cells, Dr. Purita illustrated different types of stem cells. He argued that embryonic stem cells are the most controversial stem cells. They seem to present the highest potential for correcting and curing certain conditions due to their plasticity or ability to morph into many cell types, but there are ethical issues and potential problems that have to be taken into account, e.g. the risks that the patient could potentially inherit diseases from the embryo, that cell growth might become uncontrolled in the form of a tumor or that there are immunogenic factors in the form of cell rejection reactions in the patient. Other types of stem cells comprise e.g. induced pluripotent stem cells which are produced from adult cells to be­-come pluripotent. Concerning pluripotent cells, Dr. Purita explained that with their potential for unlimited expansion, pluripotent cells are a potential source for regenerative medicine and tissue replacement after injury or disease.

Donor-adapted problems following ligament surgery in lower extremities

In his second presentation, Prof. Dr. José Ricardo Pécora, São Paulo, Brazil, gave a detailed overview of aspects concerning microstructure and surgery techniques in ligament injuries. Most of the ligament injuries – especially of the ACL – compromise the microstructure of the ligament, as he explained. Thus, he concluded that grafts should be applied to treat these injuries. He visualized explicitly how grafts are used for the surgical treatment of the lesions and demonstrated various grafts that can be applied, such as bone-patellar tendon-bone, hamstring, and allografts. For surgical treatment, he presented the techniques at the tunnels that are made in the femur and tibia, and the grafts that are applied to substitute the ligament. Prof. Pécora expounded that concerning the femoral and tibial tunnels, different techniques are applied and currently discussed, e.g. various positions in which the tunnels can be orientated in the context of the anatomical situations.

Prof. Pécora presented the results of a cohort study from the Danish Knee Ligament Reconstruction Registry, including revision after primary ACL reconstruction (n = 12,193 procedures) and re-revision rate after revision ACL reconstruction (n = 1,079 procedures) in all clinics performing ACL reconstructions in Denmark for the period from 2005 – 2010. This observational population-based study revealed a revision ACL reconstruction rate of 4.1% after five years. Revisions occurred most frequently after 1 – 2 years, and risk of revision was higher in patients below 20 years of age with 8.7% compared to patients older than 20 years of age (2.8%). As Prof. Pécora reported, there was no gender relationship concerning the necessity for revision. As most frequent causes for graft failure leading to revision, the cohort study listed new trauma in 38%, an unknown cause in 24% and the femoral tunnel position in 20% of total failures. Prof. Pécora explained his opinion that failure in the context of the techniques, e.g. missing the right position of the tunnels, play an important role in the graft failures. There are two different tunnel position techniques, as Prof. Pécora illustrated, namely isometric, which is more vertical, and anatomic, which is more transversal.

Concerning problems on the donor’s site, Prof. Pécora named more trauma and extensor mechanism regarding the bone-patellar tendon-bone, while in the hamstring, the extensor mechanism is spared, but the strength of the knee flexors can be decreased. For the patellar ligament, Prof. Pécora presented several special treatment issues that should be respected, e.g. that bone grafting, PRP-treatment, and growth factors are recommended to reduce anterior knee pain. Regarding the patellar ligament, there is a risk of more anterior knee pain, especially when the patient must kneel in sports like wrestling or judo. In the hamstring, there is less donor site mobility, but a risk of a decrease of the knee flexor’s strength and an uncertainty about whether there will be regrowth of the hamstring tendons within two years. With allografts, there are no donor problems, as Prof. Pécora explained, but a greater rate of graft ruptures. He concluded that allografts are an adequate treatment option to treat multiligamental lesions, in which multiple reconstructions are needed.
Sports and aseptic osteonecrosis of the knee – causes and effects

In his talk, Dr. Lucio Honório Carvalho, Belo Horizonte, Brazil, first spoke about bone marrow edema-like signals can represent true edema, trabecular necrosis, cysts, fibrosis and cartilage fragments. BML are a controversial condition as they can be split into different conditions depending on whether they are subchondral or non-subchondral, traumatic or non-traumatic, as well as reversible or irreversible. Differential diagnoses are contusions/fractures, cyst formation/erosions, hematopoetic and infiltrated marrow disuse/overuse, transient bone marrow edema, subchondral insufficiency fractures, or true osteonecrosis. Dr. Carvalho showed examples of BML and explained that traumatic subchondral lesions can be caused by bone contusions and that the edemas show indistinct margins and resolve in 2 – 4 months by themselves – no matter whether they are compressive or tensile – and that they are mostly sports-related. Traumatic subchondral lesions are most commonly related to ACL lesions. Typical is a lateral femoral condyle edema as well as anterior subchondral contusions when the posterior cruciate ligament is involved. Open physes are mostly connected with avulsion fractures and patellar dislocation. BML can also be degenerative cartilage lesions in osteoarthritis associated with a small amount of cartilage, meniscus extrusion and focal cartilage defect. Furthermore, three transient conditions can produce BML: transient osteoporosis, regional migratory osteoporosis, and complex regional pain syndrome. Transient osteoporosis typically occurs in the femoral head in women during pregnancy and peripartum. Regional migratory osteoporosis can produce BML, but it migrates in different joints including hips, knees and metatalar heads of middle-aged men. Both transient osteoporosis and regional migratory osteonecrosis can progress to insufficiency fractures, while the complex regional pain syndrome never does. Avascular knee necrosis can occur in the form of three types: most commonly as subchondral insufficiency knee fracture, as systemic avascular necrosis, and rarely as post-arthroscopy osteonecrosis. The syndrome of a subchondral insufficiency knee fracture most frequently occurs at an age > 50 years. The true avascular necrosis occurs mainly in men > 45 years and in patients with systemic diseases. It can also occur in connection with chemotherapy, radiation, alcohol abuse, use of corticosteroids, and smoking. The post-arthroscopy osteonecrosis can be associated with meniscectomy, radiofrequency, and cartilage debridement. Subchondral insufficiency fractures have an acute onset without trauma, occur in patients > 45 years old, possibly as an exacerbation of chronic pain, and are potentially reversible if subchondral bone and cartilage are intact. The true avascular necrosis occurs at any age with an acute exacerbation of chronic pain and the patient also experiences pain at rest. It is a manifestation of an underlying systemic disease, mostly connected with steroid treatment, and is not reversible. Post-cartilage surgery subchondral bone erosions can occur as an inflammatory arthropathy with hematopoetic and infiltrated marrow. Dr. Carvalho explicated that subchondral insufficiency fractures are not to be equated with osteonecrosis (irreversible insufficiency fracture), but that osteonecrosis could be an insufficiency fracture that becomes irreversible with the production of a subchondral fragment. The presence of a subchondral area of a low T1 sign > 4 mm thick is a predictor of irreversibility. The subchondral insufficiency related to osteonecrosis is a differential diagnosis of bone infarcts which are observed in systemic conditions. As Dr. Carvalho explained, BML are not correlated with pain or functional status. There is no clear relation between sports level and BML. Dr. Carvalho expounded several treatment options in detail – conservative as well as operative. He illustrated that in those cases where the BML are > 50% of the condyle size or > 5 cm³, it can lead to a collapse and arthroplasty should be the best treatment option. If the area of the BML is > 3.5 cm³ without signs of osteonecrosis, the conservative treatment is the best treatment choice, as Dr. Carvalho exemplified in detail. Conservative treatment options consist of painkillers, anti-inflammatory drugs, analgesics and most importantly protected weight bearing for 3 – 8 months. Further conservative treatment options, e.g. pulsed electromagnetic fields, laser therapy and hyperbaric treatment are described in the literature, reported Dr. Carvalho. He presented two types of drugs for the conservative treatment: bisphosphonates, which can lead to osteostat inhibition and avoid structural failure, and prostacyclin, a vasodilatation drug. However, long-term results for the latter have so far been insufficient. Hence, further studies are needed on the conservative drug treatment. If non-operative treatments fail, the aim is to stabilize microtrabecular fracture and to encourage a healing response. Potential surgical treatment options are fluid bone substitutes with which the material flows to closed fracture environments and which are currently still under evaluation. Another potential treatment option that Dr. Carvalho presented at the end of his talk is surgical treatment regarding stimulation of a healing response similar to hip treatments with a core decompression and bone marrow concentrate.
SPORT – RISK FOR HIP AND SPINE?

Sports in the elderly – degenerative disease and of potential overstressing of the spine

Nowadays, we experience an increasing life expectancy with an increase of about two years per decade, as Dr. René Malzkorn, Nagold, Germany, informed the participants at the beginning of his presentation. The average life expectancy in 2014 was 78 years and more people reach a high age with good health. As Dr. Malzkorn explained, the foundation for a long life is laid in early childhood and many relevant factors such as nutrition, health, treatment, education, etc. are continually improving. We have a certain influence by ourselves on our potential to become old, such as consuming good food, doing a lot of exercise, avoiding stress, not smoking, etc. As a basis, our genetic predisposition determines how old we are going to be, but within these boundaries, we can have significant influence on the way we are living.

Concerning the physiology of ageing, our morphological and functional changes lead to decreasing physical fitness, e.g. human beings lose 20 – 40% of their muscle mass between 20 and 40 years of age, and endurance performance declines after the age of 30 by up to 15%. Mainly affected are people in their middle ages, and factors promoting the decline are too much work and other stress factors, poor quality of nutrition and not enough physical activity. Degenerative processes in the spine include local arthrosis, disc degeneration, loss of lumbar disc height, degenerative listhesis, and stenosis syndromes, such as stenosis of the spinal canal, stenosis of the foramina, as well as tendon and ligament symptoms. Concerning a solution for a reasonable handling of these problems, Dr. Malzkorn displayed in detail. Consequences of these are less movement, neurological symptoms, muscle spasms and pain. Furthermore, on a myo and fascial level, high muscle tension, trigger points and fascial pain become relevant.

One problem is inappropriate acting with respect to age, e.g. insufficient care concerning practicing sport activities such as soccer or tennis, whereupon problems can suddenly arise in the form of pain, etc. Dr. Malzkorn described the consequences as block of movement, local pain, radiated pain, muscle spasms, neurological symptoms, as well as tendon and ligament symptoms. Concerning a solution for a reasonable handling of these problems, Dr. Malzkorn explained that professional athletes train their specific sport up to 50 – 60%, only, and, additionally, train their muscular strength, balance and stability, and perform stretching and physiotherapy.

He recommended applying the same to elderly people. First, the acute problem should be found out and treated as best as possible. Then, typical movements of the specific sport should be checked and the technique should be changed if necessary. The patient’s problem should be identified concerning pain/restrictions/loss of strength, etc. while applying the respective appropriate imaging diagnostics. Dr. Malzkorn presented analytic methods like the dynamic spine and posture analysis and muscle strength measurements.

For the treatment of the problem, he recommended

1. medical therapy with injections, shock wave, taping, surgery, and activating insole systems,
2. physiotherapy, massages, and warmth,
3. change of the exercise procedure in the specific sports, and
4. an extensive training schedule.

The second step would be the muscle formation

1. without fitness equipment,
2. through gymnastics, and
3. by vibration training.

As a third treatment step, Dr. Malzkorn listed stretching, relaxation, and balance training. Also, fascia training with a roller is an option. Furthermore, Dr. Malzkorn depicted the application of supports and orthoses for the protection and support of the spine, the versatile concept Spinova, the stabilizing orthosis SacroLoc, and the LumboTrain as an active support for muscular stabilization.
Typical sports-induced problems in the hip joint and their treatment

Over the past 20 years, sports injuries in athletes have dramatically increased, as Dr. Lincoln Paiva Costa, Belo Horizonte, Brazil, explained. In the USA for example, 38 million young athletes annually participate in organized sports. Medical treatment for sports lesions and injuries affecting the hip and groin is common. Sports-related injuries in the hip and groin region occur in 5 – 9% of high school athletes, and in adult soccer players, hip and groin injuries account for 12 – 16% of all injuries. It is assumed that the risk of injuries in the hip and groin region is increased by quick cutting movements, accelerations, decelerations, and directional changes in respective sports.1 Dr. Costa illustrated that there are different ways to classify the lesions. One possibility is that lesions can be classified concerning the involved structure, such as bone lesion or soft tissue lesion, and onset character, such as acute traumatic, chronic overuse, neurological or acquired.2 As the best classification, Dr. Costa recommended the classification based on location as intra-articular, extra-articular, regional musculoskeletal, or non-musculoskeletal hip disorders.3 He depicted various differential diagnosis of intra-articular musculoskeletal hip pain disorder, e.g. hip dislocation, stress fracture, femoroacetabular impingement, and acetabular labral tear. Concerning extra-articular musculoskeletal hip pain disorder, he listed hip pointer/contusion, hip bursitis, muscle strain, tendinopathy, great trochanteric pain syndrome, and snapping hip syndrome. Common regional musculoskeletal hip pain disorders include pubalgia, osteitis pubis and sports hernia. Non-musculoskeletal hip pain disorders can be gastrointestinal, e.g. lymphadenitis, genitourinary, e.g. urinary tract infection, or a pelvic tumor.4

Dr. Costa explicated the acetabular labral tear in more detail. The labrum acts as a shock absorber, joint lubricator and pressure distributor. Acetabular labral tears are responsible for hip and groin pain in 22 – 55% of patients and occur from isolated or repetitive injury. Pivoting on a loaded femur or activities that place excessive force on the labrum can lead to an acetabular labral tear. The pain worsens with activity and is aggravated by walking, prolonged sitting and impact activities, as Dr. Costa explained. Radiographs and MRI can be applied. While in radiographs the lesions are often not visible, the MRI identifies the lesions with a sensibility of 87%. Conservative treatment is applied first and when this does not lead to an improvement after 2 – 3 months and the patient still experiences pain, surgical treatment can also be applied.5

Concerning classifications, Dr. Costa explicated that there are different ways to classify the lesions. One possibility is that lesions can be classified concerning the involved structure, such as bone lesion or soft tissue lesion, and onset character, such as acute traumatic, chronic overuse, neurological or acquired. As the best classification, Dr. Costa recommended the classification based on location as intra-articular, extra-articular, regional musculoskeletal, or non-musculoskeletal hip disorders. He depicted various differential diagnosis of intra-articular musculoskeletal hip pain disorder, e.g. hip dislocation, stress fracture, femoroacetabular impingement, and acetabular labral tear. Concerning extra-articular musculoskeletal hip pain disorder, he listed hip pointer/contusion, hip bursitis, muscle strain, tendinopathy, great trochanteric pain syndrome, and snapping hip syndrome. Common regional musculoskeletal hip pain disorders include pubalgia, osteitis pubis and sports hernia. Non-musculoskeletal hip pain disorders can be gastrointestinal, e.g. lymphadenitis, genitourinary, e.g. urinary tract infection, or a pelvic tumor.6

Dr. Costa reported that although it is rare, it can occur in contact sports, with posterior dislocation being with 87 – 93% much more common than anterior dislocation. It requires emergent treatment (reduction within 6 hours) – if not treated fast enough, there is a risk of osteonecrosis, and with the dislocation, labral tear and chondral lesions can occur, too. The closed reduction works in most cases, as Dr. Costa explained, but in some cases, it can be necessary to apply an open reduction. In addition, he stressed the importance of protected weight-bearing for 6 – 8 weeks.7 Femoral neck stress occurs with an incidence of 20% in female track and field athletes. It is an overuse injury that results from repetitive micro-trauma. The femur accounts for about 5 – 7% of the stress factors. The groin pain becomes worse with activity and there is a history of recent significant increase in activity to which the body is not adapted. The Devas classification distinguishes between the distraction type and the compression type. With the radiograph, the lesions can usually not be identified, but the MRI displays the lesions. The treatment is usually nonsurgical with protected weight-bearing and activity restrictions. Dr. Costa emphasized that it is important to investigate possible causes of stress fractures.8

Talking about osteoarthritis, he explicated that there is a higher incidence of osteoarthritis in former track athletes and in former long-distance athletes. Theories of the pathophysiology include repetitive trauma and underlying hip deformity. Athletes with intra-articular hip pain, hip deformity, and secondary arthritis of Tönnis grade 2 or more have poor outcomes with hip preservation surgery, as Dr. Costa explained. Again, the conservative treatment is the first choice of treatment, and a modification of activity and therapeutic exercise is essential. In cases of missing good results of the conservative treatment, surgical treatment is applied.\(^1\)

Afterwards, Dr. Costa gave a detailed explanation of the extra-articular musculoskeletal hip pain disorders with the example of the hip pointer/contusion. Contusions to the iliac crest and surrounding soft tissues are common in contact sports and result in significant pain and decreased function. Subperiosteal edema or bleeding from nutrient vessels represent the hip pointer and account for 35% of all hip pointer/contusions. It can be diagnosed clinically with the presence of pain in the buttck and the lateral thigh. Success rates for conservative treatment exceed 90% and include activity modification, physical therapy, NSAIDs, ice/heat, and corticosteroid injection, as Dr. Costa depicted. Shock wave therapy has also been found to be effective in multiple studies, but is not yet clearly defined. Surgical treatment is a further option in cases of failure of conservative treatment.\(^2\)

In the snapping hip syndrome, there is an audible snap or pop that occurs when the hip is brought through a range of motion. It is typically exacerbated by sporting activity, may be associated with pain and is classified as intra-articular, internal, or external. It can be diagnosed with dynamic ultrasound and the initial treatment consists of stretching, physical therapy, NSAIDs and corticosteroid injections. Surgical treatment is only applied in rare cases where conservative treatment fails.\(^3\)

The sports hernia is an exclusion diagnosis, as Dr. Costa explained. It is a painful soft tissue injury of the groin (Ghimore’s groin, athletic pubalgia, groin disruption) in the form of a soft tissue defect of the posterior abdominal wall and its accompanying pain. It occurs with an incidence of 10 – 13% in soccer players and is caused by stress and pivot forces placed on this area. The tendon of the oblique muscle and the adductors is often torn. It presents with chronic groin pain that radiates to the inner thigh and is worsened by athletic activity. Ultrasound and MRI usually do not display the defect; the diagnosis is mostly performed clinically. Conservative treatment has a low rate of success when sports hernia is present, thus surgical treatment is necessary in most cases.\(^4\)

Osteitis pubis represents an isolated or repetitive insult to the pubic symphysis and surrounding structures, Dr. Costa explained. High-stress forces are transferred through the pubic symphysis and surrounding structures during kicking, rapid acceleration, deceleration, or sudden directional changes. There is pain in the pubic symphysis, proximal adductor pain, or pain in other adjacent structures. Diagnostic tools are the Faber test, radiographs and MRI. Conservative treatment should be applied including physical therapy, NSAIDs, and corticosteroid injection, while in cases of persisting problems surgical treatment (curettage, wedge resection surgery) is necessary.\(^5\)

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High-speed trauma of the spine – focus on high-risk sports

About 5,000–6,000 severe injuries of the spine happen annually in Germany, reported Prof. Dr. Christoph Josten, Leipzig, Germany. An analysis by the ARAG (Allgemeine Versicherungs-AG, 09/2010) investigating the frequency of accidents in German athletes (men and women) in relation to their respective sports, showed that only about 3% of the documented sports injuries were injuries of the spine, as Prof. Josten depicted. A retrospective study of 562 patients with a traumatic fracture of the spine described that the most common causes of accidents were high-energy falls (39%), followed by traffic accidents (26.5%).7

As a general remark, Prof. Josten depicted that cervical spine injuries occur more often in younger patients and that these are more dangerous. Furthermore, he demonstrated that the therapy of spine traumas can vary between ‘not invasive at all’ and ‘highly invasive’. After the presentation of several case studies of spine fractures and their treatment, Prof. Josten depicted that in general, surgical stabilization is necessary for fractures of the lower cervical spine and that conservative treatment is only appropriate for certain stable fractures.4

Comparing different types of sports, Prof. Josten illustrated that better equipment in skiing and snowboarding has led to a decrease in general injuries while a feeling of security has led to an increase in spinal injuries of up to 130–407%. He reported on a study with 939 skiers and snowboarders, in which 20% were admitted with spinal injuries, including 30% cervical, 32% thoracic, 32% lumbar and 6% sacral injuries.11

As a result of the study, he illustrated that spinal injuries in both skiers (61%) and snowboarders (71%) most often occurred from falls. While snowboarders often fall backwards (58%) or land rather ‘hard’ on both feet which results in more fractures of the thoracic and lumbar spine, skiers often fall forwards (54%) resulting in a higher incidence of cervical injuries. However, with a trend of more jumps and aerial maneuvers in skiers, it is believed to see an increase in thoracic and lumbar fractures as well, as Prof. Josten visualized.

Mountain biking has been an Olympic discipline since 1996, Prof. Josten reported. In downhill events, a speed of up to 70 mph (110 km/h) over rocky uneven ground can be reached. In mountain biking, traumas to the spine (which make up 10% of all injuries) mostly happen through falls on the handlebars. In a study with 1,037 patients with mountain biking injuries, 12% of injuries were to the spine, of which 56% had to be operated on and 24% included spinal cord injuries, as Prof. Josten illustrated.11

Concerning horseback riding, Prof. Josten described that hospital admissions of equestrians in the USA are equal to those of skiers and that in terms of accidents, it is more dangerous than motorcycling, skiing, football and automobile racing. Furthermore, there is a higher percentage of lumbar and thoracic fractures, and injuries depend on the riding style (cross-country vs. classical style). After presenting various case reports, Prof. Josten gave the résumé that generally speaking ‘sport is not murdering’, but that sport activities include – depending on the kind of sport – high risks for acute, but also chronic diseases.
Acromioclavicular (AC) joint dislocations: How we can help them

AC joint dislocation is a very common injury of the shoulder with reports in the literature varying between 19.6% and 32%, as Dr. Harold Vanderschmidt, Dubai, United Arab Emirates, explained. He illustrated the anatomy of the region around the AC ligament and the fascia. The lateral clavicula and the AC joint are embedded between two surrounding fasciae and of these, the deltatopectoeid fascia is very important for the stability of the AC joint, as Dr. Vanderschmidt depicted. He illustrated the trauma mechanism of AC joint dislocations, which are often observed, e.g. in rugby and also in quad biking, as he reported from his own practice in Dubai, where quad biking is common. The AC dislocation can be recognized by clinical examination, X-ray, or optionally via MRI (e.g. if there is only a swelling and the dislocation is not clear).

For the classification of AC joint dislocations, Dr. Vanderschmidt presented modern minimally invasive techniques for the treatment of AC joint dislocations and discussed several advantages and disadvantages. As advantages for open surgery, he mentioned fewer technical difficulties, a good overview and lower costs. It is possible, however, in certain open operations, that the deltatopectoeid fascia, which is important for stability, is injured and not reconstructed after the surgery. This leads to a secondary instability and loss of reduction. Dr. Vanderschmidt expanded his expert opinion that operation is recommended as 70% of patients with Rockwood type 3 injury develop a scapula dysfunction that is symptomatic in about 58% of patients and a pre-arthrótic deformation and instability. Furthermore, he explained that superior labral anterior posterior (SLAP) lesions, supraspinatus tendon (PASTA type) lesions, and sometimes fractures that might not be seen on the X-ray occur in 15 – 20% of Rockwood type 3 lesions.

Dr. Vanderschmidt presented modern minimally invasive techniques for the treatment of AC joint dislocations and discussed the most common classifications with the Tossy classification1 and the Rockwood classification2. Depending on the grade of injury, non-operative or surgical treatment are recommended. Conservative treatment is mainly recommended for Rockwood type 1 and 2 injuries, while surgical treatment is recommended for Rockwood type 4, 5, and 6 injuries. For Rockwood type 3 injuries, the question of treatment is being debated. This leads to a secondary instability and loss of reduction. Dr. Vanderschmidt expanded his preference for the reconstruction of the joint with hamstrings. Further problems related to open surgery can also concern soft tissue healing (if the soft tissue is not repaired properly), residual instability and the necessity of hardware removal. Open surgery with tapes with repairing soft tissues as less invasive methods without metallic implants avoids the necessity of hardware removal and is, therefore, associated with fewer complications. However, there are infection risks from foreign materials, cuts through the bone, and the costs for the tapes. As advantages of arthroscopic surgery, Dr. Vanderschmidt pointed out that in this case the two lesions could be treated in parallel – the stabilization of the SLAP tear could be performed in parallel to the fixation of the AC joint injury. As a result, there was a good reduction and healing process. 7 weeks after the surgery, the X-ray still showed good stabilization, good reduction and good cosmesis.

In a second case, a 37-year-old man had a motorcycle accident and suffered a Rockwood type 5 injury. In the endoscopy, a SLAP lesion grade 2 became apparent, which looked degenerative, and thus probably existed prior to the accident. As another advantage of arthroscopy, Dr. Vanderschmidt pointed out that in this case the two lesions could be treated in parallel – the stabilization of the SLAP tear could be performed in parallel to the fixation of the AC joint injury. As a result, there was a good reduction and healing process. 7 weeks after the surgery, the X-ray still showed good stabilization, good reduction and good cosmesis.

In his case presentation, Dr. Vanderschmidt reported on a 35-year-old pilot who had a motorcycle accident and presented with a Rockwood type 5 injury. In the endoscopy, a SLAP lesion grade 2 became apparent, which looked degenerative, and thus probably existed prior to the accident. As another advantage of arthroscopy, Dr. Vanderschmidt pointed out that in this case the two lesions could be treated in parallel – the stabilization of the SLAP tear could be performed in parallel to the fixation of the AC joint injury. As a result, there was a good reduction and healing process. 7 weeks after the surgery, the X-ray still showed good stabilization, good reduction and good cosmesis.

In a second case, a 37-year-old man had a motorcycle accident and suffered a Rockwood type 5 injury. After the arthroscopic surgery, there were still problems and the muscles were still swelling. The X-ray showed that the reduction was not good and a subsequent CT scan revealed that there was not only an elevation of the AC joint but also a rotation which caused the problem. A repair of the soft tissue was performed and a hook plate applied. After the repair of the deltatopectoeid fascia, the ligaments, and the capsule, the results were good. The postoperative X-ray displayed a good reduction. Dr. Vanderschmidt reported that he has changed his operative methods to less invasive surgeries with tapes and repair of the AC complex. Furthermore, Dr. Vanderschmidt also reported on his rehabilitation methods after AC joint reconstructions with the application of soft shoulder braces. He only applies rigid braces for rehabilitation in very complex shoulder reconstructions, not in AC joint surgeries.

Concluding, Dr. Vanderschmidt summarized that the rehabilitation process needs enough time. If it is performed too quickly, secondary problems like ruptures of the construct can occur. Minimally and less invasive surgeries should be performed in the first three weeks after injury and after that, hamstring grafts should be applied. MRI and arthroscopy are necessary as in 15 – 20% other pathologies can occur. Arthroscopic specialists should use at least a double-button (and not only a single-button) for surgeries. Open surgeries with a hook plate and good structure repair and rehabilitation can be considered as good methods. In both operation techniques, there is a failure rate of about 13% (literature). New fixation techniques with tapes are promising with the advantage of avoiding hardware removal. Finally, Dr. Vanderschmidt emphasized that in any surgery the soft tissues have to be taken care of, as missing repair of soft tissues leads to instabilities.

Dr. Victor Feniksov, Moscow, Russia, first presented data concerning the global epidemiology related to back pain and spine injuries, showing that depending on the sport, incidence rates of back pain occur in athletes from 1.1% to as high as 30%. Furthermore, about 7% of lumbar spine injuries and 7.6% of cervical spinal cord injuries are related to sports. In the USA, 8.7% of all new cases of spinal cord injuries are related to sports and sport trauma is the 2nd most common cause of spinal cord injuries for Americans aged 30 years and younger (National Athletic Trainers Association). From Russia, he reported that sports injuries account for 2 – 5% of all accidents and 2 – 3% of hospitalized patients in the neurosurgical departments present with acute spinal cord injuries.

Types of back injuries or diseases observed in sport can be muscle strains and ligament sprains, hyperflexion and hyperextension injuries, degenerative disc disease, spondylolysis and spondylolisthesis, repetitive nerve injury and scarring (‘stinger’), Scheuermann’s disease (juvenile kyphosis), and fractures, as Dr. Feniksov expli­cated in detail. Muscle strains and ligament sprains are the most common cause of back pain in athletes. They can be caused by athletic overuse, improper body mechanics and technique, lack of proper conditioning, and/or insufficient stretching. Typically, the back pain returns with activity and decreases with rest, Dr. Feniksov explained and recommended rest, NSAIDs and pain medications, as well as special exercises for the treatment. For the prevention of repeated injuries, he listed aerobic exercise, avoiding repetitive overuse (particularly rotation), exercises that mimic activities of athletic competition, and evaluation and correction of poor technique and mechanics.

Hyperflexion and hyperextension injuries are caused by forced forward and backward movements, respectively, Dr. Feniksov illustrated. As potential treatment options he mentioned activity restriction, NSAIDs, pain medications, brace fixation, segmental active stabilization with muscle balance physiotherapy, and/or surgery. Degenerative disc disease is a common cause of back pain in adults, Dr. Feniksov reported. Furthermore, about 5 – 10% of all athletic injuries are related to the lumbar spine. In general, 89 – 90% of patients with low-back pain improve within one month even without treatment. Concerning patients with sciatica, 80% recover with or without surgery. Nonsurgical treatment options are: bed rest, activity modifications, and/or exercise as appropriate, analgesics (NSAIDs, opioids, etc.), muscle relaxants, education, and spinal manipulation therapy.

Spondylolysis and spondylolisthesis are both common causes of back pain in young athletes and typical for sports with twisting and hyperextension of the spine (e.g. gymnastics), as Dr. Feniksov illustrated. Treatment options include: rest, NSAIDs, specific exercises, bracing and/or surgery.

Dr. Feniksov described several cases from the Clinical City Hospital No. 1 n. a. Pirogov N.A., including the application of supports and orthoses. First, he described two cases without surgical treatment in which the patients were treated with rest, NSAIDs, pain medications, specific exercises and depending on their medical condition with the LordoLoc for the lower back or the SofTec Dorso for the whole spine. In the first case, an industrial climber fell from the third floor of a building and suffered a burst fracture (L1). He was treated in the first step with prone position three-segment percutaneous pedicle screw fixation and microdecompression, and in the second step with supine position transthoracic partial corpectomy (L1) and vertebral body replacement with telescopic cage. Afterwards, the SofTec Dorso (with shell) was applied for postoperative stabilization, followed by initial stages of rehabilitation with stabilization by the SofTec Lumbo with CFR rods. In the second case, a disc herniation was treated after full-endoscopic inter-laminar left discectomy L4 – L5 with postoperative stabilization with the SofTec Lumbo (with shell), followed by initial stages of rehabilitation with stabilization by the SofTec Lumbo with CFR rods. As a summarizing conclusion, Dr. Feniksov stated that bracing is the optimal option for the management of sports injuries of the spine in the postoperative stabilization and if there is no indication for surgery.
SUPPORTS AND ORTHOSES – FIRST RESULTS OF NON-INTERVENTIONAL STUDIES

Clivia Frommhold from Bauerfeind, Germany, presented a summary of a non-interventional study with an international investigation of the effectiveness of supports and/or orthoses in conservative and postoperative treatment of sports injuries. This international comparison of therapies has the goal to collect treatment intentions as well as procedures and support the sport medical research worldwide. The first step was to analyze durations of treatments, indications and environmental circumstances as well as the usage of products in different countries and the usage of additional treatments.

A spectrum of 13 products was included in the study, which are all designed—amongst others—for the treatment of sports injuries, respectively for different implementations at the knee, the ankle, the back and the elbow. More than 1,500 participants from 37 study centers in Germany, Austria, Hungary, Poland, Italy, the Middle East, Singapore, Canada, and the USA were included. The first results presented at the conference included rankings of prescribed supports/orthoses for different countries. The analysis is ongoing and publishing of the results is in process.

Dr. Steffi Schauer, Markranstädt, Germany, reported on a study by Susanne Habetha and Ute Golbach (Institut für Gesundheits-System-Forschung GmbH Kiel, Germany) who conducted a survey about studies investigating the effects of knee bandages and orthoses on the basis of the information that was available from interrogations of members of Eurocom e.V. and their online search in Google/Pubmed on the German market in 2014. They analyzed 79 different documents from 14 different producers including in total about 2,350 participants/2,000 patients.

As a main outcome, they found an overall significant improvement in disorders, joint function, and patient activity following the application of the knee bandages and orthoses, as Dr. Schauer explained. Another study found that the use of a functional knee brace led to a significant increase in the postural stability of patients with meniscal lesions, on the injured as well as on the healthy side. A study investigating the effect of a patellar bandage on the postural control of individuals with patellofemoral pain syndrome found improved stability by the tape and came to the conclusion that a patellar bandage provided additional sensory input and increased proprioceptive feedback and this could be related to the improvement of postural control. A further study demonstrated that bracing can partially limit tibial rotation during stressful activities after anterior cruciate ligament reconstruction with a hamstring graft. Dr. Schauer presented the results of an analysis she conducted in her practice in Markranstädt, Germany, in which patients were treated with knee support/orthosis respectively to their different indications, including the GenuTrain Active Support, GenuTrain P3 Active Support and the SecuTec functional orthosis. She observed a relevant effect in reduction of pain intensity by the knee support/orthosis in the majority of patients which was also mirrored by a large proportion of patients who reported not to have used painkillers in the last week. The stabilizing effect of the knee support/orthosis was also rated as good by more than half of the patients and as very good by more than a further quarter of patients. Additional results concerned the wear time of all knee supports/orthoses, the functional state of the patient, and the evaluation of everyday activities which were combined in the evaluation. In summary,
weakness improved quadriceps muscle
the use of NMES for quadriceps muscle
knee osteoarthritis. According to this study,
treatment of quadriceps muscle weakness
(NMES) device in a small case series of
of a neuro muscular electrical stimulation
A recent study evaluated the outcomes
exercise and pointed electro­stimulation.
Dippold also found out that the changed
application of the respective knee supports/
revealed that the patients profit from the
favor of the knee supports/orthoses which
Ziegan and Dippold (1985) in patients with knee osteoarthritis.6
Dippold also found out that the changed
pattern can be normalized with isometric exercise and pointed electro­stimulation.
Bauerfeind.com
Dr. Schauer further illuminated
spectrum of different sports, including
(5). Overall, athletes came from a broad
practice patterns. Concerning the various
types of athletes who came to the clinic
practice, as Dr. Abraham explained, such as
strongly present in the clinic, as Dr. Abraham explained, such as
versus chronic injuries in 45 of the 85
most frequently occurring ligament sprains
(14), knee tendonosis (14), and patellofemoral
injuries (6), patellar subluxation (5), knee capsular strains (3), knee bursitis (1), knee
capillary strain (1), knee sprain (1), quadriceps strain (1), and ankle sprain (1), ankle
tendinitis (1), and Achilles tendonosis (2), and a few back injuries with lumbar
spine sprain/strain (2) were documented. The types of braces that were applied
included GenuTrain (55), MalleoTrain
Plus (12), EpiTrain (10), GenuTrain P3 (2),
MyoTrain (2), LumboTrain (2), and AchilloTrain Pro (2). Patient compliance was good:
overall: 83 completed the study, 1 patient
was lost to follow­up and 1 patient failed
to complete. Several parameters were in­
vestigated to evaluate the characteristics of the
braces, including various specifications
self­reported by the patients. The average
comfort rating was high with 8.95 out of
10 points. Brace handling was regarded as
easy to very easy overall and the feedback
regarding pain reduction and stabilization
was very positive with an overall rating of
good to very good, as Dr. Abraham report­
ed. He explained that the results were
very reassuring for him with regard to the
application of braces and that he learned
a lot about how patients use braces. For
recovery and acceleration of therapy,
braces were the clearly predominant used
application (66/77.6%). Physiotherapy was
applied much more rarely (14/16.5%). Only a small percentage of patients underwent surgery (4/4.7%). Dr. Abraham reasoned that the braces allow for an earlier return to functional activities which translates to a faster recovery. Against the background of his 25 years practical experience, he further explicated the selection of the right applications for the individual patient out of the potential various treatment options, such as braces, orthotics, therapeutic drugs, injections, chiropractic, physiotherapy, massage therapy, osteopathy, acupuncture, modalities, and surgery.

Dr. Abraham presented the example of a typical study patient, a 10-year-old hockey goalkeeper, who suffered a knee medial collateral ligament (MCL) sprain saving the puck. The proposed treatment for this patient – with the exclusion of major instability – would be the application of a GenuTrain brace, medication (e.g. Tylenil/Advil) for pain, self-massage, gentle range of motion, physiotherapy, and gradual return to hockey wearing the brace for protection and support, as Dr. Abraham described. Due to very good flexibility, the GenuTrain brace allows hockey goalkeepers to perform their activity. Thus, it is advantageous for these athletes, especially also for a pediatric population, explained Dr. Abraham.

In general, the use of a brace has several advantages, as Dr. Abraham elucidated, e.g. that it is economical. Also, it allows early function and mobilization and reduces medication use and side effects. Furthermore, it controls pain and swelling, and promotes healing and proprioception. As a rule, a properly fitting and comfortable brace can assist with most soft tissue injuries, he explained. Dr. Abraham also emphasized that fitting and comfort of a brace are central for the compliance of a patient to wear a brace. Protected (early) mobilization promises capillary ingrowth into an injured area, regeneration of muscle fibers, more parallel orientation of myofibers, and stimulation of collagen growth in tendons, as Dr. Abraham expounded. Moreover, it decreases pain and swelling, improves nourishment to articular cartilage, reduces muscle atrophy, and prevents joint stiffness. With the example of a case study of a protected mobilization in a patient with an MCL sprain, Dr. Abraham visualized well-protected mobilization versus bad immobilization with inappropriate braces that potentially can lead to prolonged immobility of patients.

In the last section of his presentation, Dr. Abraham addressed the central role of proprioception – the ‘sense of self’. In the limbs, the proprioceptors are sensors that provide information about joint angle, muscle length, and muscle tension, which is integrated to give information about the position of the limb in space, he explicated, and proposed to regard proprioception as the ‘sixth sense’. Proprioceptors are located in the skin, muscle, tendon and joint (capsule and ligaments), and the proprioceptor information is sent to the spinal cord and the higher brain centers. Dr. Abraham further illuminated that with a ligament injury and osteoarthritis there is a decline in joint positioning sense and that braces increase afferent input by providing increased cutaneous stimulation. In this context, Dr. Abraham explained that in his experience, a lot of Bauerfeind products support patients’ proprioception well, e.g. the GenuTrain braces.

A further important aspect of braces that Dr. Abraham described is compression, e.g. with the MyoTrain, which controls swelling and pain, stabilizes the muscles, increases blood flow, and decreases muscle vibration and potentially soreness. In addition, the MyoTrain is e.g. sort of a unique brace that can be applied in some types of common injuries in hockey players, as Dr. Abraham clarified. He further presented several braces with their respective application specifications. The EpiTrain can be applied e.g. for the indications lateral epicondylitis (tennis elbow), medial epicondylitis (golfer’s elbow), triceps tendinopathy and general tears. Dr. Abraham reported that he observed ‘fabulous’ results from the EpiTrain in his patients, e.g. regarding helping patients to control pain, return to sport or in their daily life. Potential indications for the application of the GenuTrain include patellofemoral syndrome, tendonosis, bursitis, Osgood-Schlatter, osteoarthritis, ligament injuries, post-ACL repair and patellar subluxation, as Dr. Abraham listed. He reported that he observed ‘fabulous’ results from the GenuTrain in his patients, e.g. regarding helping patients to control pain, return to sport or in their daily life. Potential indications for the application of this brace for certain sports needs of athletes such as ice hockey players, as it is washable and breathable, for example. Potential indications for the application of the MyoTrain include quadriceps contusions, quadriceps strains and hamstring strains. Dr. Abraham illustrated that ankle sprains are very common injuries and are not banal, and thus should be treated with respective care.

The MalleoTrain and MalLeoTrain Plus can be applied for the treatment of ligament sprains, tendinopathies, osteoarthritis, and instability, e.g. in the initial phases of the treatment, but also when returning to sport. Dr. Abraham recommended the application as ‘fabulous’ especially for dance, gymnastics and martial arts because of the open heel, as these athletes need the sensory feedback from their heel to practice their sport. The AchilloTrain Pro is used e.g. for the critical indication of Achilles tendonosis and calcaneal bursitis, as Dr. Abraham amplified at the end of his presentation.