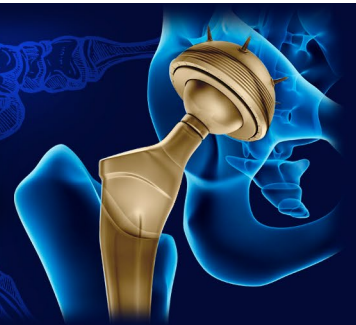


# Orthopaedics Research Review™



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Issue 8 - 2019

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- > No benefit to allograft augmentation of ACL autografts
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## Abbreviations used in this issue:

ACL = anterior cruciate ligament; APT = adductor-iliopsoas tenotomy;  
BMI = body mass index; CP = cerebral palsy; FO = femoral osteotomy;  
HKA = hip-knee-ankle angle; IKS = international knee society;  
KOOS = Knee injury and Osteoarthritis Outcome Score;  
PRP = platelet-rich plasma; THA = total hip arthroplasty;  
TKR = total knee replacement.

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## Welcome to the latest issue of Orthopaedics Research Review.

In this issue we explore the latest research relating to lower limb orthopaedics. We start with an interesting study that aimed to assess methods to reduce graft failure in paediatric ACL reconstruction but found that the addition of a soft tissue allograft to hamstring autograft repair resulted in a significantly increased risk of graft rupture. Following on with research on ACL reconstruction, a large database study with a mean 18-year follow up found a reduction in secondary meniscal tears with ACL surgical intervention within 6-months of injury. Other research covered in this issue include the finding that increased BMI is a risk factor for revision hip arthroplasty and obese patients with open ankle fractures have higher perioperative complications, hospital length of stay and costs.

I hope you find the research in this issue useful to you in your practice and forward to your comments and feedback.

Kind Regards,

Dr Andrew Stephens

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## Allograft augmentation of hamstring anterior cruciate ligament autografts is associated with increased graft failure in children and adolescents

Authors: Perkins C et al.

**Summary:** This retrospective cohort study assessed if rates of hamstring anterior cruciate ligament (ACL) reconstruction graft failure could be improved by increased autograft construct size, achieved by tripling hamstring tendons, or allograft augmentation. 354 patients (mean age 15.3-years; skeletally mature or  $\leq$  2-yrs off skeletal maturity) who underwent hamstring autograft ACL reconstruction with or without soft tissue allograft augmentation were included in the analysis; 198 knees received a 4-strand doubled semitendinosus and gracilis autograft (4-STG; average 8.3 mm diameter graft), 91 knees received a 5-strand tripled semitendinosus and doubled gracilis autograft (5-STG; average 8.9 mm diameter graft) and 65 knees received 6-strand doubled gracilis and semitendinosus autograft augmented with a soft tissue allograft (6-STGAllo; average 9.2 mm graft diameter). At a mean follow-up of 26-months there was an overall 14% rate of graft rupture and 7% experienced a contralateral ACL tear. Graft failure was most common in the allograft augmented group (20% failure vs 14% and 12% for 4-STG and 5-STG, respectively;  $P=0.51$ ). No clinical benefit in terms of reduced graft failure was observed by upsizing the autologous hamstring graft by tripling one of the hamstring tendons (odds ratio 1.2). Allograft augmentation resulted in a 2.6 times increased risk of graft rupture compared to comparably sized hamstring tendon autografts.

**Comment:** This is a very useful finding that assists with choice of ACL reconstruction graft. The optimum graft appears to be between 8.5mm and 9.0mm diameter for this cohort of younger patients. The lack of benefit in using a thicker augmented graft may be the result of graft impingement or attrition against the femoral condyle in narrow femoral notches. Alternatively, the immune response of ligamentisation may be altered by the presence of non-native tissue. The authors recommendations are well considered.

Reference: *Am J Sports Med* 2019;47(7):1576-82

[Abstract](#)



## Orthopaedics Research Review™

**Independent commentary by Dr Andrew Stephens**, who is a fellowship trained Foot and Ankle Surgeon who has a wide experience in managing acute sporting and trauma of the lower limb as well as painful long term conditions of the foot and ankle. He began seeing foot and ankle conditions as a level 2 sports trained physiotherapist and progressed to completing an Honours degree in Medicine from Sydney University and completed Specialist training through the prestigious Northside Orthopaedic training program Australian Orthopaedic Association. He has completed fellowships in sports, trauma and arthroplasty in Victoria and the highly sought after Sydney Foot and Ankle fellowship. He has been operating in Switzerland with the esteemed Prof Hintermann with experience gained in sports injuries and managing the arthritic foot and ankle. As a fellow of the Royal Australian College, Australian Orthopaedic Association, American Academy of Orthopaedic Surgeons and Societie Internationale de Chirurgie Orthopedique et de Traumatologie he is at the cutting edge of foot and ankle orthopaedics. Dr Stephens believes that patients appreciate his unrushed and informative manner. They are given time to ask questions and become fully aware of their medical conditions and treatment options. You can expect a comprehensive thorough assessment of your orthopaedic condition with opportunity for all questions and enquiries to be answered in an empathetic manner.



## Secondary meniscal tears in patients with anterior cruciate ligament injury: relationship among operative management, osteoarthritis, and arthroplasty at 18-year mean follow-up

**Authors:** Hagmeijer M et al.

**Summary:** This cohort study provides level 3 evidence for the long term impact of primary treatment of an ACL injury on secondary meniscal tears and total knee arthroplasty. Data on 1,398 primary ACL injuries was extracted from a large geographic database and statistically examined using both Kaplan-Meier and adjusted multivariate survival analyses. At a mean follow-up of 18-years, there was an overall 16.8% rate of secondary meniscal tears (235 tears in 196 patients). Significantly higher rates of secondary tears were observed in patients who had a delayed ACL reconstruction or who were managed non-operatively compared to those who had a reconstruction within 6-months of injury (33% vs 19% and 7%, respectively;  $P < 0.01$ ). Secondary tears were predominantly medially located (77%) and more than half had a complex morphology (56% of medial tears and 54% of lateral tears). A partial meniscectomy was required in 73% of secondary meniscal tears, 16% were treated non-operatively and 11.5% required a repair. In no cases was a total knee arthroplasty performed for a secondary tear.

**Comment:** Traditional teaching was that medial meniscal tears were the result of repeated subluxation in an unstable knee. These results suggest that almost slightly less than 1 in 5 of ACL deficient knees were sufficiently unstable to cause further subluxations and predominantly medial meniscal damage. This population had their risk of meniscal damage more than halved by stabilising the knee with an ACL reconstruction. It is likely that while the total rate of progression to knee osteoarthritis is not affected by ACL reconstruction, limiting the episodes of knee subluxations and subsequent meniscectomy is a significant factor for the subsequent development of degenerative joint disease.

**Reference:** *Am J Sports Med* 2019;47(7):1583-90

[Abstract](#)

## Activity modification and load management of adolescents with patellofemoral pain

**Authors:** Rathleff M et al.

**Summary:** This Danish prospective intervention study included 151 adolescents (aged 10-14 years) to assess a 12-week activity modification and load management strategy for patellofemoral pain in adolescents. The 12-week intervention consisted of 4 weeks of reduced patellofemoral load achieved via activity modification (weeks 1-4), 4 weeks of home based exercises (weeks 5-8), 4 weeks of return to sport guidance (weeks 9-12) and 4 physical therapist sessions. The 7-point global rating of change questionnaire, as well as Knee injury and Osteoarthritis Outcome Score (KOOS) and objective hip and knee torque were used to assess the successfulness of the program. At 12-weeks, 86% of participants achieved an improved, or better, questionnaire rating and 68% had returned to sport. At 6- and 12-months the questionnaire scores were 77% and 81% while return to sport rates rose to 79% and 81%. The KOOS subscales of pain, sport/recreation and quality of life all showed large improvements in symptoms with 13-24 point gains after the program. Hip and knee torque also showed improvements with a 20% overall increase.

**Comment:** Activity modification and specific physiotherapy exercise are often forgotten when managing patellofemoral pain. It is often driven by the patient wanting a quick fix to the issue. This article is a timely reminder of the effective contribution that such non-operative programs offer for the management of patellofemoral pain.

**Reference:** *Am J Sports Med* 2019;47(7):1629-37

[Abstract](#)

## Platelet-rich plasma for patellar tendinopathy

**Authors:** Scott A et al.

**Summary:** This randomized controlled trial of leukocyte-rich platelet-rich plasma (PRP) or leukocyte-poor PRP versus saline assessed treatment efficacies for patellar tendinopathy. The multi-site, single-blinded trial enrolled 57 athletes with patellar tendinopathy for  $\geq 6$  months (Blazina stage IIIB). All patients received a single injection of PRP (2 formulations of varying leukocyte concentrations; rich or poor) or saline plus a 6-week supervised rehabilitation program. There was no significant difference in mean change seen in any of the outcomes assessed (Victorian Institute of Sport Assessment- patellar, pain or global rating of change) at any time point (6-weeks, 12-weeks, 6-months or 12-months) between the treatment arms.

**Comment:** This is a well designed, blinded trial with excellent control of confounders and a suitable control. It clearly demonstrates the placebo effect of an injection for patellar tendinopathy. The exercise based rehabilitation program was the likely effective treatment that accounted for improvement across groups. There is no evidence in this study for the use of PRP in patellar tendinopathy.

**Reference:** *Am J Sports Med* 2019;47(7):1654-61

[Abstract](#)

## Body mass index is associated with risk of reoperation and revision after primary total hip arthroplasty

**Authors:** Sayed-Noor A et al.

**Summary:** This study of the Swedish Hip Arthroplasty Register included 83,146 patients who underwent an elective total hip arthroplasty (THA) for primary osteoarthritis between 2008 and 2015 to investigate the effect BMI has on 2-yr reoperation, 5-yr revision and 90-day risk of death rates. The register-based observational study stratified patients into 6 groups (underweight, normal, overweight, class I obesity, class II obesity and class III obesity) based on World Health Organisation definitions and calculated adjusted and unadjusted parameter risks. Increased risk for both 2-yr reoperation and 5-yr revision of THA were observed for all BMI groups above the normal weight group ( $BMI \geq 25$ ) with increased risk with each incremental BMI classification. The predominant underlying reason for the increased risk of reoperation/revision was infection. Other factors that contributed to an increased risk of THA reoperation/revision were un-cemented or reversed hybrid fixation or non-posterior surgical approach. An increased 90-day mortality rate was associated with class III obesity ( $BMI > 40$ ), male sex and higher ASA class.

**Comment:** This is a timely and apt use of registry data to explain the risks of revision arthroplasty related to increased BMI. It is consistent with previous studies in finding a BMI of  $> 40$  a significant risk factor for complications in lower limb arthroplasty.

**Reference:** *Acta Orthop* 2019;90(3):220-25

[Abstract](#)

## Implant survival and patient-reported outcome following total hip arthroplasty in patients 30 years or younger

**Authors:** Mohaddes M et al.

**Summary:** This matched cohort study of 1,008 patients from the Swedish Hip Arthroplasty Register compared hip implant survival rates in patients younger versus older than 30-years. 504 total hip arthroplasties performed in Sweden between 2000 and 2016 in patients  $\leq 30$  years old (study group) with full complete data sets were included and matched to a comparison group of patients aged  $> 30$ -years. 10-year hip implant survival rates, calculated by the Kaplan-Meier method, were 90% and 94% for the study group and comparison patient group, respectively. 15-year rates were 78% and 89%. Generic health status (quantified using the EQ-5D and EQ-VAS index) was lower in the study group pre-operatively but 1-year post-operative increases were similar between groups.

**Comment:** The young arthritic or avascular hip which is symptomatic and functionally limiting presents a significant challenge to the surgeon and patient. These results provide an insight to the survival of hip arthroplasty in the younger population. While it does not provide justification of early intervention, it supports the use of hip arthroplasty where appropriate in the younger population with survival data that both patient and surgeon can understand.

**Reference:** *Acta Orthop* 2019;90(3):249-52

[Abstract](#)





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†Non-inferior efficacy (5-day sum of pain intensity difference) and significantly lower incidence of constipation, nausea and vomiting (nominal  $p < 0.001$  for all events); PALEXIA® IR 50mg vs. oxycodone IR 10mg. Secondary endpoint. Primary endpoint was met.

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**PBS Information:** This product is not listed on the PBS.





## Primary surgery to prevent hip dislocation in children with cerebral palsy in Sweden: a minimum 5-year follow-up by the national surveillance program

**Authors:** Kiapekos N et al.

**Summary:** This Swedish population study compared outcomes of 2 techniques – skeletal reconstruction and soft tissue procedure – for primary preventative hip dislocation surgery in paediatric patients with cerebral palsy (CP). 186 patients who underwent primary, preventative hip displacement surgery by either bilateral adductor–iliopsoas tenotomy (APT; n=129) or uni- or bi-lateral femoral osteotomy (FO; n=57; 34 unilateral, 23 bilateral) in one of 12 Swedish hospitals between 1995 and 2012 were included in the analysis. Mean age of patients was 4.9-years in the APT group and 5.6-years in the FO group and 90% of patients had a Gross Motor Function Classification System level of IV or V. The groups showed similar 5-year outcomes including: failure rates (45% vs 47% for APT vs FO;  $P=0.8$ ), reoperation rates (43% vs 39%;  $P=0.5$ ) and migration percentage >50% rates (2% vs 9%;  $P=0.2$ ). Cox regression analysis and logistics showed an increased risk for failure after APT, but not FO, with increased pre-operative migration percentage. No significant association was found between outcome and age, sex, Gross Motor Function Classification System level or CP subtype. The authors concluded that surgical prevention of hip displacement in children with CP has high revision rates irrelevant of surgical technique and that APT remains a valuable option in this population especially in cases of migration percent <50.

**Comment:** This is a good descriptive study of the use of either soft tissue releases or osteotomy to maintain hips in a reduced articulation. The choice of bony or soft tissue procedure is clear with an osteotomy favoured to correct greater subluxation and migration of the femoral head. A discussion with the parents has to include the likelihood of recurrence.

**Reference:** *Acta Ortho* 2019;June 18 [Epub ahead of print]  
[Abstract](#)

## Influence of the post-operative axis on the clinical results of total knee replacement for severe varus deformities: does a slight residual varus improve the results?

**Authors:** Saragaglia D et al.

**Summary:** This French study analysed a series of varus deformity-correcting total knee replacements (TKR) to assess outcomes stratified by post-operative axis; residual varus versus neutral or mild valgus. 208 knees underwent a TKR for significant varus deformity (hip-knee-ankle angle [HKA] <170°, mean pre-operative HKA angle  $166 \pm 3^\circ$ ). Post-operation, 88 knees had a slight residual varus alignment (HKA  $177.8 \pm 1^\circ$ ) and 62 knees were classified as neutral or mild valgus alignment (HKA  $181 \pm 1^\circ$ ). Outcomes were assessed using the international knee society (IKS) score and Oxford knee score. Although slightly better outcomes were seen by both measures in the post-operative mild valgus group the results were not significant (mean IKS scores  $178 \pm 22$  vs  $181 \pm 22$  for post-operative varus vs valgus, respectively;  $P=0.44$ . Oxford KS  $20.4 \pm 9$  vs  $19.2 \pm 9$ ;  $P=0.4$ ).

**Comment:** Balanced ligaments, correct joint axis, normal joint line, patellar tracking and weight bearing axis are principles to be adhered to when performing total knee replacement. This study helps to support the principles of joint replacement which should be adhered to in the majority of cases.

**Reference:** *Int Orthop* 2019;43(7):1621-26  
[Abstract](#)

## Effect of obesity on perioperative complications, hospital costs, and length of stay in patients with open ankle fractures

**Authors:** Gil J et al.

**Summary:** This study extracted data from the US National Inpatient Sample, produced by the Healthcare Cost and Utilization Project, to examine the association of obesity and perioperative complications in patients undergoing surgery for an open ankle fracture. A cohort of 88,755 patients who underwent ankle surgery for an open ankle fracture between 2002 and 2014 was analysed of which 10.1% (n=8,972) were classed as obese. There was a significant increase in the prevalence of obese patients over this time, rising from 4.5% in 2002 to 17.1% in 2014 ( $P<0.0001$ ). The incidence of any perioperative complication, as well as cardiac-specific complications, were significantly increased in obese patients (8.6% vs 5.2%; 1.8% vs 0.8%; both  $P<0.0001$ ). Obese patients also experienced longer hospital stays post-operatively and incurred greater costs related to surgical management (4.8-days vs 3.7-days; US\$16,412 vs US\$13,815; both  $P<0.0001$ ).

**Comment:** Ankle fractures managed operatively have good outcomes if reduced and fixed anatomically. Perioperative complications are a major determinant of poor outcomes. Obesity cannot be managed in the short time period available prior to internal fixation or stabilisation of an ankle fracture. This study provides evidence for taking the necessary precautions pre-operatively if surgery is deemed appropriate.

**Reference:** *J Am Acad Orthop Surg* 2019;27(11):e529-34  
[Abstract](#)

## Long-term outcome after surgical treatment of intra-articular tibial plateau fractures in skiers

**Authors:** Bäumlein M et al.

**Summary:** This German case series reports the long-term patient-reported outcomes and radiographic evaluation of a cohort of skiers who were treated surgically for a tibial plateau fracture. The cohort was composed of 83 skiers (mean age at time of surgery  $49.8 \pm 12.9$ -years; mean follow-up  $10.3 \pm 1.9$ -years). In all cases the lateral knee compartment was impacted by the fracture, 2 cases also involved the medial compartment. Long-term functional outcomes post-surgery as assessed by patient-reported Tegner Activity Scale and Lysholm Score decreased significantly during the follow-up period (median 6 to 5 and 100 to 95, respectively; both  $P<0.01$ ). Osteoarthritis severity was assessed by X-ray examination and rated according to the Kellgren and Lawrence score. A significantly higher grade of osteoarthritis was found in all knee compartments post-operatively ( $P<0.01$ ) compared to at the time of operation, with the most severe osteoarthritis found in the lateral compartment.

**Comment:** Tibial plateau fractures clearly accelerate knee joint degeneration. Lateral plateau fractures are usually more common and are seen as the higher grade of lateral compartment arthritis. The anatomical reduction and fixation of the articular surfaces has significant impact on progression of arthritis. This allows for longer functional independence with activities.

**Reference:** *Arch Orthop Trauma Surg* 2019;139(7):951-59  
[Abstract](#)

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