Not just another ACL paper: the importance of ‘Outcomes of single bundle arthroscopic anterior crucial ligament reconstruction in a limited resource setting’

Jason L Koh 1,2

Approximately 85% of the world’s population lives in developing countries, and the impact of musculoskeletal disease and injury in these countries is enormous, greater than that of tuberculosis, diarrhoea and malaria combined.1 There are tremendous difficulties in the delivery of adequate orthopaedic care, and extremely limited data and very few articles are available on the outcomes. The researchers from these areas are even fewer.1 4 Clinician-researchers face significant challenges, including the lack of resources, infrastructure and experience in treating patients and in performing research.5 As a result, the research into the care provided in these countries is significantly under-reported and researchers under-represented.

What is role of a global orthopaedic journal like JISAKOS? The mission of this journal is to ‘engage and advance the knowledge and treatment of musculoskeletal diseases and disorders’ by publishing ‘high-quality peer-reviewed original research and systematic reviews from the international community of orthopaedic surgeons and sports medicine physicians’.6 One of the unique aspects of this journal is a commitment to the international community, reflecting the wide variety of experience and conditions treated. Seemingly similar anatomic injuries may occur under widely varying conditions and be treated with different techniques and rehabilitation. Functional outcomes and goals may be different. However, we can use the common tools of scientific evaluation to perform a robust assessment of treatment.

Sherchan, Rai and colleagues have performed a rigorous scientific study of 194 anterior cruciate ligament (ACL) reconstruction patients in Nepal, a country of limited resources.6 Although ACL reconstruction is relatively ‘routine’ and has been extensively studied, typically papers reflect the experience of well-funded medical centres in highly developed countries and reflect a bias towards positive results. This paper is different in many ways. Nepal is considered ‘among the least developed countries in the world’, with an average per capita GDP estimated to be $1071 in 2019.8 It is a largely rural country, with 80% of the population is engaged in farming. There are enormous barriers to adequate medical care. As in many developing nations, the burden of injuries is extremely high, due to limited resources that can be devoted to injury prevention methods as simple as seat belts and helmets or as complex as road design. Traffic accidents are common. The healthcare infrastructure is extremely limited, with most patients unable to afford orthopaedic treatment. There is a single orthopaedic centre in the country, and the patients who can afford care often must seek it outside of the country in India or China. Patients who suffer an ACL injury often cannot afford immediate treatment or try to compensate. As a result, care is significantly delayed.

The conditions resulted in many differences when compared with most other articles on ACL reconstruction. They can be broadly grouped into several areas—preop, procedure and postop—and each of these interact to play a role in patient outcomes.

The preoperative differences are profound. Unlike many other papers, in these patients, the predominant mechanism of injury was road traffic accidents, rather than sports. In the rural population, the second most common mechanism was accidents at work farming. In Nepal, the costs of the surgical procedure are a significant financial burden. Patients delay or try to avoid surgery; the patients who come to surgery have significant symptomatic instability and likely had high grade pivot shifts. Notably, several of the rural patients had suffered fractures as a result of instability episodes. Limited resources, both personal and institutional, resulted in substantial delays in treatment (10 and 21 months in urban and rural groups, respectively), and consequently over 70% of these patients had meniscal tears and some already had radiographic signs of osteoarthritis.

The procedure was a single bundle hamstring ACL reconstruction with an anteromedial portal technique. An endobutton was used on the femoral side and a bioabsorbable interference screw on the tibial side. A double bundle technique was not performed, likely in part due to the increased complexity and cost associated with the multiple tunnels and fixation devices. Additionally, the authors noted several other challenges. Many Nepalese are of short stature (mean 156 cm),9 which has been associated with smaller hamstring grafts. To achieve a minimum 8 mm graft diameter, the graft was folded over multiple times, consequently decreasing graft length and the amount of tissue within the tunnel and potentially adversely affected graft incorporation and outcomes. Other resource limitations resulted in needing to reflush sterilise trays in between cases and that ORs were often used for infected wound management, both of which may have increased the risk of contamination.

Postoperatively, a standard rehabilitation protocol was provided, but given the circumstances of many of the patients, there was limited ability to comply with the protocol. It appears that most of these patients had an early return to activity. The rural patients engaged in significant manual labour and farming in irregular terrain. Nepal is extremely mountainous, with 8 out of the 10 of the world’s highest mountains including Everest. These patients are high demand individuals, comparable to construction workers on an irregular building site, or maybe professional footballers (who have a perfect pitch to work on).

Despite these difficulties, at a minimum 2 years of follow-up, outcomes were fairly
good in this challenging patient population, with International Knee Documentation Committee (IKDC) scores for urban and rural groups 85 and 81 and Tegner-Lysholm scores 88 and 85, both of which statistically favoured urban patients. Lachman and pivot shift scores were similar. Graft failures were 17.6% and 16.8%, respectively, with many failures occurring in the first 6 months, possibly related to graft incorporation or the early resumption of demanding physical activity, and although higher than some studies, are comparable to other authors reporting on younger patients with high demands.10–12 The rate of deep infection was acceptably low, 1.8%/3%/urban/rural.

This important and pioneering paper demonstrates that even under challenging conditions, ACL reconstruction can provide clinical stability and good function and quality of life in patients in countries with limited resources. There are significant delays in treatment and often minimal postoperative care, and consequently these patients may have a higher risk of reinjury or worse outcomes than if they had prompt intervention and rehabilitation. However, many patients are restored to normal or near-normal function.

In addition to the data presented in this paper, it is significant that this work is the product of a team of investigators from Nepal. Substantial barriers exist to conducting research exist in low-income and middle-income countries,13 and these investigators are to be commended for their dedication and hard work in producing this excellent paper. We need more high-quality research from investigators focused on these populations that have been underrepresented in the literature. ISAKOS is a uniquely global organisation that takes an active role in supporting these efforts through such activities as the Young Investigator Program, which invites promising researchers to the Biannual Meeting, and resources such as Research Symposium, the ISAKOS Basic Methods Handbook for Clinical Orthopaedic Research and formal mentoring. Our JISAKOS editor-in-chief, Niek Van Dijk, has taught dozens of clinicians the basics of paper writing and publishing. These efforts have been valuable—the corresponding author, Dr Saroj Rai, is a Young Investigator Award winner (figure 1), who had the opportunity to visit with Dr Volker Musahl at Pittsburgh, whose support and influence are acknowledged by the author. Beyond what this paper tells us about ACL surgery, it also informs us that training, collaboration and mentorship can positively influence academic research productivity in a limited resource setting. JISAKOS is honoured to advance orthopaedic knowledge by publishing this groundbreaking paper that is particularly relevant for much of the world.

Figure 1 Young Investigator’s Fellowship Reception, ISAKOS Meeting 2017. From left to right: Scientific Committee Deputy Chair Jason Koh, MD, MBA; ISAKOS President Marc Safran, MD; Young Investigator Fellowship Winner Saroj Rai, MD, PhD; Scientific Committee Chair Volker Musahl, MD.

On behalf of the Scientific Committee I (2) am delighted to comment on this important and pioneering paper by the author. This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited, an indication of whether changes were made, and the use is non-commercial. See: http://creativecommons.org/licenses/by-nc/4.0/.

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ORCID iD
Jason L Koh http://orcid.org/0000-0002-1814-5051

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Correction: Not just another ACL paper: the importance of ‘Outcomes of single bundle arthroscopic anterior crucial ligament reconstruction in a limited resource setting’


In the above article, it was incorrectly written that there is a single orthopaedic centre in the country, and that patients who can afford care often must seek it outside of the country. The article is based on a single government hospital experience where economically poor patients come for treatment; orthopaedic surgeons in multiple centres perform ACL surgery in Nepal and occasional complex patients seek care in India.

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