Knee dislocations: experience at the Hôpital du Sacré-Coeur de Montréal

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Introduction: Although many options exist for ligament reconstruction in knee dislocations, the optimal treatment remains controversial. Allografts and autografts have both been used to reconstruct the cruciate ligaments. We present the results of reconstruction using artificial ligaments at Hôpital du Sacré-Coeur in Montréal. **Methods:** We reviewed the treatment of all patients with knee dislocations seen between June 1996 and October 1999. The Lysholm score, ACL-quality of life (QoL) questionnaire, physical examination and Telos instrumented laxity measurement were used to evaluate the results. **Results:** Twenty patients (21 knees) participated in the study. The mean (and standard deviation [SD]) Lysholm score was 71.7 (18). Results from the ACL-QoL questionnaire showed a global impairment in QoL. Mean (and SD) range of motion and flexion were 118° (10.9°) and 2° (2.9°) respectively. Mean (and SD) radiologic laxity evaluated with Telos for the anterior and posterior cruciate ligaments were 6.1 (5.7) mm and 7.3 (4.5) mm respectively. **Conclusions:** Knee reconstruction with artificial ligaments shows promise, but further studies are necessary before it can be recommended for widespread use. This is the first study to show specifically a severe impairment in QoL in this patient population.

Introduction : Même s'il existe plusieurs possibilités de reconstruction ligamentaire dans les cas de luxation du genou, le traitement optimal suscite toujours la controverse. On a utilisé à la fois les allogreffes et les autogreffes pour reconstruire des ligaments croisés. Nous présentons les résultats de reconstructions au moyen de ligaments artificiels effectuées à l'Hôpital du Sacré-Cœur à Montréal. **Méthodes :** Nous avons passé en revue le traitement de tous les patients ayant subi une luxation du genou et qui ont consulté entre juin 1996 et octobre 1999. On a utilisé le score de Lysholm, le questionnaire sur la qualité de vie (QdV) LCA, l'examen physique et la laxité mesurée au Telos pour évaluer les résultats. **Résultats :** Vingt patients (21 genoux) ont participé à l'étude. Le score médian de Lysholm (et l'écart type [ET]) s'est établi à 71,7 (18). Les résultats du questionnaire QdV-LCA ont montré un déficit global de la QdV. L'amplitude médiane (et l'ET) du mouvement et celle de la flexion se sont établies à 118 ° (10,9 °) et 2 ° (2,9 °) respectivement. La laxité radiologique médiane (et l'ET) mesurée au Telos dans le cas des ligaments croisés antérieur et postérieur s'est établie à 6,1 (5,7) mm et 7,3 (4,5) mm respectivement. **Conclusions :** La reconstruction de genou au moyen de ligaments artificiels est porteuse de promesses, mais d'autres études s'imposent avant que l'on puisse en recommander l'application générale. Il s'agit de la première étude qui montre spécifiquement un déficit grave de la QdV dans cette population de patients.

Knee dislocations are uncommon injuries resulting from both high-energy and low-energy trauma. Motor vehicle collisions, industrial accidents, falls and sports injuries are the leading causes.[1,2] There is a high potential for functional impairment from the major trauma to the knee ligaments involved and from associated injuries. Traditionally, the term knee dislocation has been applied, not only to truly dislocated knees but also to knees with rupture of 2 or more of the 4 major knee ligaments, usually involving bicruciate ligament injury.[3] Whereas nonoperative treatment was once deemed acceptable,[3] it is now mostly reserved for patients with very low functional demands. Open or arthroscopic ligamentous reconstruction is now standard care for most patients.[4] However, the optimal reconstructive procedure has yet to be defined. Some surgeons advocate early reconstruction of all ligaments,[5-8] whereas others, fearing increased arthrofibrosis, limit the

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immediate procedure to surgical reconstruction of the posterior cruciate ligament (PCL) and repair of the posterolateral corner.[9-11] Autografts and allografts have been used successfully in reconstruction of the cruciate ligaments.

A number of artificial ligaments have been designed for reconstruction of knee ligaments. The ligament augmentation device (LAD) is the prototype. It was designed to reinforce anterior cruciate ligament (ACL) reconstructions.[12] After an initial wave of enthusiasm for these implants in the 1980s, their popularity waned owing to their poor long-term survival and their marginal benefits in supplementing autografts. The Ligament Advanced Reinforcement System (LARS; Surgical Instruments and Devices, Arc-sur-Tille, France) represents a new generation of ligament implants. Nau and colleagues[13] have recently reported outcomes similar to bone–patellar tendon–bone autografts in a prospective randomized study of ACL reconstruction with 24 months of follow-up.

At Hôpital du Sacré-Coeur in Montréal, early reconstruction of both cruciate ligaments and posterolateral corner with the use of LARS ligaments has been the practice for treating knee dislocations. In this study we wished to evaluate the outcome of our institutional protocol of immediate ligament reconstruction in knee dislocations using LARS artificial ligaments.

Patients and methods

We reviewed the charts, including operative protocols, of all patients treated for knee dislocation by the senior author (P.R.) with a follow-up of at least 1 year. These cases made up all the knee dislocations managed at our institution from June 1996 to October 1999. Data about the traumatic event, associated injuries, operative findings, surgical reconstruction and complications were collected according to a standardized protocol. Injuries were classified according to the anatomy-based Schenck classification: KD-I is a dislocation in which 1 of the cruciate ligaments is intact; KD-II is a tear of both cruciate ligaments with intact collateral ligaments; KD-III are bicruciate injuries with either an associated medial cruciate ligament tear (KD-IIIM) or lateral cruciate ligament tear (KD-IIIL); and KD-IV is a rupture of all 4 major knee ligaments.

Patients were managed initially according to advanced-trauma life support guidelines. Open dislocations were treated emergently with irrigation and debridement. All knees were provisionally stabilized with a knee immobilizer or external fixation (1 case) while awaiting recovery of the soft tissues prior to ligament reconstruction. Angiography was performed selectively depending on the physical findings and the ankle–brachial index.

A medial parapatellar arthrotomy was done in all cases. The knee joint was assessed for damage to the cruciate ligaments, cartilage and menisci. Meniscal tears were repaired when possible. The ACL and PCL stumps were sutured with heavy nonabsorbable suture. Only the anterolateral bundle of the PCL was reconstructed. Guide pins were inserted with use of PCL and ACL drill guides. A guide pin was inserted from the anterior tibia to the PCL footprint. Another guide pin was inserted at the origin of the anterolateral bundle of the PCL. This pin was driven proximally into the femur. A cannulated reamer was then used to create the bony tunnels. ACL tunnels were positioned in a standard fashion. The sutures tied to the PCL and ACL stumps were then fed through the corresponding bony tunnels to ensure realignment of the ligament stumps as described by Marshall et al.[14] The LARS ligaments were inserted through the bony tunnels in the tibia and femur and positioned to lie adjacent to the native cruciate ligaments. Secure fixation was achieved with interference screws. The PCL and ACL tunnels have 6 and 7 mm diameters respectively. The interference screws are usually 8 mm in diameter, but larger screws are sometimes used when bone quality appears suboptimal. There was 1 case of bony avulsion from the tibial insertion of the ACL, which was fixed with intraosseous sutures. The collateral ligaments were approached by means of appropriate medial and lateral incisions. Posterolateral corner avulsions from bone were fixed with intraosseous sutures. Mid-substance tears were sutured and reinforced with LARS. Depending on the structures involved, LARS ligaments were positioned to reconstruct the LCL (in bony tunnels in the fibular head and distal femur) or popliteus (in the tibia and distal femur).

Postoperatively, patients followed an intense rehabilitation protocol. A hinged brace was used to protect the collateral ligaments. Patients were only allowed touch weight-bearing at first. Ice and interferential currents were employed to decrease swelling. Indomethacin (25 mg tid for 3 wk) was given to patients without contraindications. The initial phase of the program was aimed at regaining range of motion by passive and active exercises. In between physical therapy sessions, patients were prescribed at-home exercises. As soon as flexion reached 115° patients were started on low-resistance stationary cycling. When adequate muscle strength and control were regained, progressive weight-bearing was allowed. This usually took at least 6 weeks. Focus was then shifted to strengthening with closed-chain exercises, including squats and riding the exercise bicycle with increasing resistance. The next step centred on proprioceptive exercises. Once the swelling had resolved and balance, proprioception and strength had been regained, patients started jogging and moved on to sport-specific drills if jogging was well tolerated. The time of progres-