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Nerve injury during anterior cruciate ligament reconstruction: A comparison between patellar and hamstring tendon grafts harvest

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ABSTRACT

Background: Tendon harvesting for anterior cruciate ligament reconstruction often injures sensory branches of the saphenous nerve. The reports on the prevalence of these injuries are scarce, while the implications on patient satisfaction are not known. Our objective was to compare the prevalence of sensory nerve injuries in patellar to hamstring autograft harvesting for anterior cruciate ligament reconstructions and follow up their postoperative course.
Methods: Between 2012 and 2014, patients who had a primary anterior cruciate ligament reconstruction with bone patellar tendon bone or hamstring autografts were included (n = 94). We evaluated and compared demographic details, level of activity and postoperative sensation disturbances between both groups. Data was analyzed retrospectively.
Results: The mean postoperative follow-up time was 23 months. At the last follow-up 46 (77%) patients of the patellar tendon group and 22 (58%) of the hamstring tendons group reported on reduced sensation; however, in both groups a quarter of these patients experienced full recovery within an average of seven to eight months. There were more patients in the hamstring tendons group that reported on partial recovery. In most cases midline incisions for patellar tendons harvesting injured the infrapatellar branch and medial incisions for hamstring tendons harvesting injured the sartorial branch of the saphenous nerve.
Conclusions: Harvesting tendon autografts for anterior cruciate ligament reconstructions by vertical incisions had high prevalence of saphenous nerve branches injury with a minor possibility for complete recovery within the first year. The loss of sensation was perceived by patients as a minor complication.
Level of evidence: Level IV, therapeutic case series.

1. Introduction

The standard of care for a ruptured anterior cruciate ligament (ACL) of the knee in active persons with clinical instability is an arthroscopic autograft reconstruction [1]. With approximately 200,000 annual procedures in the United States [2], the most popular autografts for reconstruction are bone patellar tendon bone (BPTB) or hamstring (HS) tendons [3]. The decision to recommend operative treatment for a person with a torn ACL is multifactorial and should also contemplate possible complications. Of these, the morbidity associated with harvesting the graft, such as anterior knee pain after the use of BPTB or reduction in knee

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flexion strength after the use of HS tendons, needs to be taken into account [4]. The various techniques for graft harvesting in ACL surgery are associated with local loss of sensation to the lower leg due to sensory nerve damage during the procedure [5–7], specifically the infrapatellar branch and sartorial branch of saphenous nerve (IPBSN and SBSN, respectively). This type of injury may cause hypoesthesia, dysesthesia, painful neuroma and reflex sympathetic dystrophy. Furthermore, anterior knee pain and pain with kneeling has been directly related to damage of some of its branches [8,9]. The incidence of IPBSN injury in ACL reconstruction changes according to the surgical technique and has been reported to be as much as 50% with the BPTB autograft technique and 30 to 59% with the hamstrings technique [10,11]. The reports on the prevalence of these injuries are scarce and lack sequential follow-up, while the implications on patient satisfaction are not known. The aim of this study was to compare between the prevalence of sensory nerve injuries in BPTB and HS autograft harvesting for ACL reconstructions and follow-up their postoperative course. The hypothesis was that these injuries are common, improve with time and considered by the patient as minor.

2. Materials and methods

2.1. Patient selection

The current study was approved by our institutional review board (IRB approval number 0670-15-RMC). Between June 2012 to December 2014, 227 patients had an anterior cruciate ligament (ACL) reconstruction in our department which serves as a regional referral center for arthroscopic surgery. The study included patients who have had primary ACL reconstructions utilizing bone–patellar-tendon–bone (BPTB) or hamstring (HS) tendon autografts. This study did not include patients who had multi-ligament reconstructions, meniscal repair procedures, surgery for synovial disease (e.g. rheumatoid arthritis and pigmented villonodular synovitis), ipsilateral previous knee surgery, spinal disorders or worker compensation claim. Ninety four patients were eligible for inclusion. There were 60 patients who had ACL reconstructions with BPTB and 34 with HS tendon grafts (Table 1). The mean age was 29 ± 8 years. Currently, our preferred graft for the younger population is the BPTB while in less athletic patients we use the HS quadruple graft.

2.2. Data collection

All perioperative evaluations and operations were undertaken and reported by three senior orthopedic surgeons who work together in an academic knee arthroscopy regional referral center. In addition to the regular follow-up meetings at two weeks, six weeks, three months and six months after surgery, the patients were interviewed at a minimum of 12 months after the index operation. The interview included questionnaires regarding sensation loss (Table 2) and current activity level (Tegner activity scale [12]). The area of sensory loss was described and mapped according to a standard leg drawing (Figure 1). The most noticeable diameter of sensory loss was recorded and categorized as <5 cm, five to 10 cm, and >10 cm.

2.3. Surgical technique

Surgery was done under general anesthesia with the patient in a supine position. A leg holder and tourniquet were placed around the thigh of the affected leg. For BPTB harvest a midline vertical skin incision of approximately 10 cm was performed from the inferior pole of the patella to the tibial tuberosity. The subcutaneous tissue and the underlying bursa were then gently released with scissors. The central one third of the patellar tendon was harvested together with bony plugs of the patella and tibial tuberosity utilizing a double blade knife, electrical saw and osteotome. The remaining gap was closed by suturing the edges of the patellar tendon. For HS tendons harvest a vertical incision of approximately three centimeters was made over the pes anserinus at the level of the tibial tuberosity. The gracilis and semitendinosus tendons were identified under the subcutaneous tissue by digital palpation. The sartorial fascia was split along the fibers direction and the tendons were isolated by blunt dissection. The fascial strands of the tendons were cut under vision and a close end stripper was used to harvest the grafts after detaching their tibial attachments with sharp knife.

Table 1
Comparison between the study groups.

	BPTB	HS	p-Value
Age	26 ± 6	34 ± 9	<0.001
Male:Female	58:2	28:6	
Rt:Lt	30:30	12:22	
Follow-up (months)	24 ± 12	22 ± 10	0.3
Decreased sensation (n, %)	46, 77%	22, 58%	
Sensation loss (No, partial, complete)	14,39,7	12,19,3	
Fully recovered (n, %)	11 of 46, 24%	5 of 22, 23%	
Time to recover (months)	7 ± 4	8 ± 5	0.4
Postoperative Tegner activity scale	4 (0–9)	4 (0–9)	0.5

BPTB, bone patellar tendon bone; HS, hamstrings.

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