Case Report

Fibroxanthoma

A Complication of a Biodegradable Screw

Mir Sadat-Ali MD, PhD, FRCS, D Orth,
Quamar Azzam MBBS, MS, Mohammed Bluwi MBBS, SSC (Ortho),
Abdallah S. Al-Umran MBBS, SSC (Ortho)

Received: 25 June 2009 / Accepted: 4 November 2009 / Published online: 21 November 2009
© The Association of Bone and Joint Surgeons® 2009

Abstract

Background Biodegradable interference screws in anterior cruciate ligament (ACL) reconstruction have gained popularity because of their similar or superior fixation strength in comparison to metallic interference screws and because they do not cause imaging artifacts and do not need to be removed. **Case Description** We report the case of a 23-year-old man who presented with slowly progressive firm swelling of 2 months' duration at the site of the tibial tunnel 3 years after ACL reconstruction using a biodegradable interference screw. After curettage and débridement, the material was sent for histopathologic examination, which was reported as a fibroxanthoma.

Literature Review Reported complications are osteolysis around the screw, allergic reaction, sterile abscess formation, ganglion cyst formation, and intraarticular migration. A fibroxanthoma consists of fibroblasts and mononuclear or multinucleated cells with large lipid-filled histiocytes

(foam cells). The cells are negative for S-100 and keratin and positive for anti-human macrophage marker HAM-56. **Purposes and Clinical Relevance** Use of biodegradable screws is associated with high healing rates and low complication rates; however, awareness of their potential complications may help in early recognition and prevention of associated morbidity.

Introduction

Biodegradable screws have gained wide acceptance by arthroscopic surgeons [7, 11, 22] because they do not cause imaging artifacts and graft lacerations and do not need to be removed. They have similar or superior fixation strength in comparison to metallic interference screws [11, 21]. However, they have complications such as cyst and abscess formation [4, 7, 19, 20], breakage, and intraarticular migration [2, 18]. Although no fibroxanthoma as a complication of biodegradable screws has been reported in the English literature, a literature search shows sarcoma [9] and malignant fibrous histiocytoma [1, 8] in response to other orthopaedic implants.

We report the case of 23-year-old man who presented with slowly progressive firm swelling of 2 months' duration at the site of the tibial tunnel 3 years after anterior cruciate ligament (ACL) reconstruction using a biodegradable interference screw. After curettage and débridement, the material was sent for histopathologic examination, which resulted in a diagnosis of fibroxanthoma.

Case Report

A 23-year-old man presented to our outpatient clinic with an 18-month history of instability and recurrent giving way

Each author certifies that he or she has no commercial associations (eg, consultancies, stock ownership, equity interest, patent/licensing arrangements, etc) that might pose a conflict of interest in connection with the submitted article.

Each author certifies that his or her institution approved the reporting of this case report, that all investigations were conducted in conformity with ethical principles of research, and that informed consent for participation in the study was obtained.

This work was performed at King Fahd University Hospital.

M. Sadat-Ali (✉), Q. Azzam, M. Bluwi, A. S. Al-Umran
The University Department of Orthopaedic Surgery, College of
Medicine, King Faisal University, Dammam, Saudi Arabia
e-mail: drsadat@hotmail.com

M. Sadat-Ali, Q. Azzam, M. Bluwi, A. S. Al-Umran
King Fahd University Hospital, PO Box 40071, AlKhobar
31952, Saudi Arabia

of his right knee, especially when trying to change direction. His history revealed he sustained a twisting injury to the same knee approximately 2 years earlier while playing football. He had pain and swelling and was unable to weight bear. His doctor recommended a cylinder cast for 3 weeks followed by physiotherapy. The pain and swelling improved over 6 months; however, he noticed instability, especially when running or climbing stairs.

At the time we saw the patient 2 years after the initial injury, examination showed a positive Lachman test and a positive pivot shift test. MRI showed a complete tear of the ACL with an oblique tear of the lateral meniscus (Type II). ACL reconstruction was performed using a hamstrings (gracilis and semitendinosus) graft, and a biodegradable interference screw (Bionix Implants, Tampere, Finland) was used for fixation of the graft at the tibial tunnel. After 3 months of supervised physiotherapy, he regained full range of movements and resumed preinjury level of activities by 6 months after surgery.

Three years after the index surgery, he presented with slowly progressive bony swelling at the site of the tibial tunnel of 2 months' duration. He had intermittent pain and an unusual itching sensation at the site of the swelling. On examination, an irregular firm swelling approximately 1×1.5 cm was found near the entry portal of the tibial screw. The clinical impression was ectopic bone formation, delayed allergic reaction to the screw, or disengagement and backing out of the screw. The plain radiograph was normal (Fig. 1). The sedimentation rate and C-reactive protein were normal. The patient was given nonsteroidal antiinflammatory drugs for 3 weeks without relief.

Owing to the progressive symptoms and size of the mass, the region was explored. We observed an irregular mass localized around the tibial entry portal. The bioscrew was partially degraded and in its original position. The tunnel was obliterated with bone. The mass was curetted and the tunnel débrided and irrigated. Material obtained was sent for biopsy. Histopathologic examination showed large areas of foam cells, lipid-filled cells with abundant vacuolated cytoplasm, interspersed with fibrovascular septations. The cells were negative for S-100 and positive for anti-human macrophage marker HAM-56, which was consistent with the diagnosis of fibroxanthoma (Figs. 2, 3).

A plaster cast was applied for 3 weeks after surgery; the patient did not need any walking aid. Physiotherapy was started after cast removal. The patient's pain was relieved within 4 postoperative days. At 9 months' followup, his symptoms and the mass had completely disappeared.

Discussion

The use of biodegradable interference screws in ACL reconstruction has gained popularity [7, 13]. They typically are made from poly-L-lactic acid and offer similar or superior fixation [11, 21] in comparison to that of similarly designed metal screws for ACL reconstruction [16, 17]. Comparative studies between biodegradable and metallic screws have shown no superiority of one over the other in terms of pain, Lachman and pivot shift tests, Tegner activity level, and Lysholm score [12, 13, 15, 17]. Biodegradable screws have several advantages over metallic

Fig. 1A–B (A) AP and (B) lateral radiographs of the right knee show lucency at the proximal tibial tunnel.

Fig. 2A–B (A) Low-power (×200) and (B) high-power (×400) histologic sections reveal sheets of foamy histiocytes and fibrocollagenous tissue showing focal hyalinization (Stain, hematoxylin and eosin).

Fig. 3 A histologic section with special staining (CD68 reactive, S-100 protein negative) shows foam cells (original magnification, ×400).

screws: they do not have to be removed, they may avoid the damage metallic screws can cause to the patellar bone/tendon graft in the tunnel, and they avoid metal artifacts with imaging. The benefits of biodegradable screws, however, come with more complications. The reported complications of biodegradable screws are osteolysis around the screw [17], allergic reaction [15], and extra-articular pretibial sterile abscess [4]. Other reported complications are transcutaneous [18] and intraarticular migration [2], recurrent pretibial ganglion cyst formation [19], and intraarticular granuloma formation [7].

There is disagreement among pathologists regarding whether a fibroxanthoma represents a true neoplasm [3, 6], developmental defect [5], or reactive process [14]. Radiographic findings generally are nondiagnostic. Histologic findings of fibroblasts and mononuclear or multinucleated lipid-filled cells having the appearance of histiocytes with abundant vacuolated cytoplasm interspersed with fibrovascular septations and masses of cholesterol suggest the diagnosis [3]. Cells are negative for S-100 protein and positive for anti-human macrophage marker HAM-56, which indicates histiocyte lineage [3, 5, 10].

Use of bioabsorbable screws for fixation of graft in ACL reconstruction is effective in terms of fixation strength [7, 21] and safe with overall low complication rates [2]; however, we need to be aware of potential complications, early recognition of which may prevent associated morbidity.

References

1. Bago-Granell J, Aguirre-Canyadell M, Nardi J, Tallada N. Malignant fibrous histiocytoma of bone at the site of a total hip arthroplasty: a case report. *J Bone Joint Surg Br.* 1984;66:38–40.
2. Baums MH, Zelle BA, Schultz W, Ernstberger, Klinger HM. Intraarticular migration of a broken screw after anterior cruciate ligament reconstruction. *Knee Surg Sports Traumatol Arthrosc.* 2006;14:865–868.
3. Bertoni F, Unni KK, McLeod RA, Sim FH. Xanthoma of bone. *Am J Clin Pathol.* 1988;90:377–384.
4. Busfield BT, Anderson LJ. Sterile pretibial abscess after anterior cruciate reconstruction from biodegradable interference screws: a report of 2 cases. *Arthroscopy.* 2007;23:911.e1–e4.
5. Clarke BE, Xipell JM, Thomas DP. Benign fibrous histiocytoma of bone. *Am J Surg Pathol.* 1985;9:806–815.
6. Destouet JM, Kyriakos M, Gilula LA. Fibrous histiocytoma (fibroxanthoma) of a cervical vertebra: a case report with a review of the literature. *Skeletal Radiol.* 1980;5:241–246.
7. Dujardin J, Vandenneucker H, Bellemans J. Tibial cyst and intra-articular granuloma formation after anterior cruciate ligament reconstruction using polylactide carbonate osteoconductive interference screws. *Arthroscopy.* 2008;24:238–242.
8. Haag M, Adler CP. Malignant fibrous histiocytoma in association with hip replacement. *J Bone Joint Surg Br.* 1989;71:701.
9. Hughes AW, Sherlock DA, Hamblen DL, Reid R. Sarcoma at the site of a single hip screw: a case report. *J Bone Joint Surg Br.* 1987;69:470–472.

10. Kargi E, Gungor E, Verdi M, Kuicogiu S, Erdogan B, Alli N, Altunkaya SA. Atypical fibroxanthoma and metastasis to the lung. *Plast Reconstr Surg*. 2003;111:1760–1762.
11. Kousa P, Jarvinen TL, Kannus P, Jarvinen M. Initial fixation strength of bioabsorbable and titanium interference screw in anterior cruciate ligament reconstruction: biomechanical evaluation by single cycle and cyclic loading. *Am J Sports Med*. 2001;29:420–425.
12. Lajtai G, Schmiedhuber G, Unger F, Aitzetmuller G, Klien M, Noszian I, Orthner E. Bone tunnel remodeling at the site of biodegradable interference screws used for anterior cruciate ligament reconstruction: 5-year follow up. *Arthroscopy*. 2001;17:597–602.
13. Laxdal G, Kartus J, Eriksson BI, Faxen E, Sernert N, Karlsson J. Biodegradable and metallic interference screws in anterior cruciate ligament reconstruction surgery using hamstring tendon grafts: prospective randomized study of radiographic results and clinical outcome. *Am J Sports Med*. 2006;34:1574–1580.
14. Macdonald D, Fornasier V, Holtby R. Benign fibrohistiocytoma (xanthomatous variant) of the acromion: a case report and review of the literature. *Arch Pathol Lab Med*. 2002;126:599–601.
15. Mastrokalos DS, Paessler HH. Allergic reaction to biodegradable interference poly L-lactic acid screws after anterior cruciate ligament reconstruction with bone-patellar tendon-bone graft. *Arthroscopy*. 2008;24:732–733.
16. McGuire DA, Barber FA, Elrod BF, Paulos LE. Bioabsorbable interference screws for graft fixation in anterior cruciate ligament reconstruction. *Arthroscopy*. 1999;15:463–473.
17. Plominski J, Borcz K, Kwiatkowski K, Zabicka M. Fixation of patellar tendon bone graft in reconstruction of patellar ligaments: comparison of bioabsorbable and metal interface screws—results of treatment. *Ortop Traumatol Rehabil*. 2008;10:44–53.
18. Sassmannshausen G, Carr CF. Transcutaneous migration of a tibial bioabsorbable interference screw after anterior cruciate ligament reconstruction. *Arthroscopy*. 2003;19:133–136.
19. Sekiya JK, Elkousy HA, Fu FH. Recurrent pretibial ganglion cyst formation over 5 years after anterior cruciate ligament reconstruction. *Arthroscopy*. 2004;20:317–321.
20. Tsuda E, Ishibashi Y, Tazawa K, Sato H, Kusumi T, Toh S. Pretibial cyst formation after anterior cruciate ligament reconstruction with a hamstring tendon autograft. *Arthroscopy*. 2006;22:691.e1–e6.
21. Weimann A, Rodieck M, Zantop T, Hassenpflug J, Petersen W. Primary stability of hamstring graft fixation with biodegradable suspension versus interference screws. *Arthroscopy*. 2005;21:266–274.
22. Zantop T, Weimann A, Schmidtko R, Herbort M, Raschke MJ, Peterson W. Graft laceration and pullout strength of soft-tissue anterior cruciate ligament reconstruction: in vitro study comparing titanium, poly-d,l-lactide and poly-d,l-lactide-tricalcium phosphate screws. *Arthroscopy*. 2006;22:1204–1210.