

Case Report

Allergic Reaction to Biodegradable Interference Poly-L-Lactic Acid Screws After Anterior Cruciate Ligament Reconstruction With Bone–Patellar Tendon–Bone Graft

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Abstract: We report a case of a systemic allergic reaction to biodegradable poly-L-lactic acid (PLLA) interference screws after anterior cruciate ligament (ACL) reconstruction with bone–patellar tendon–bone graft. A 30-year-old patient complained of certain symptoms, such as an inability to focus mentally, rash on the right femur, chronic fatigue, decreased sex drive, and localized alopecia, 3 months after ACL reconstruction in the right knee. Two biodegradable PLLA interference screws had been used for proximal and distal graft fixation. Allergy testing showed a value of 7 in PLLA antigen. After removal of 1 screw in August 2000, the patient reported marked improvement, but some symptoms remained. In July 2001 he underwent arthroscopic revision ACL reconstruction with hamstrings via an implant-free technique with intensive debridement of the tunnels and removal of all scar tissue and screw rests. All symptoms disappeared, and the PLLA antigen number fell from 3 to “concentrate” 2 months postoperatively. **Key Words:** Poly-L-lactic acid—Interference screw—Anterior cruciate ligament reconstruction—Allergic reaction.

The use of biodegradable poly-L-lactic acid (PLLA) screws has several advantages over metal interference screws in anterior cruciate ligament (ACL) reconstruction with either bone–patellar tendon–bone or hamstring graft, such as good fixation, no need for material removal, and improved visualization via magnetic resonance imaging (MRI). Nevertheless, late biodegradation of the PLLA material, cyst formation at the point of insertion, failure during insertion, and a few adverse reactions in the knee have been reported. We present a case of a systemic allergic

reaction to biodegradable screws, used for ACL reconstruction.

CASE REPORT

A 30-year-old man underwent ACL reconstruction with bone–patellar tendon–bone autograft and interference screw fixation at both ends by use of 2 biodegradable PLLA screws (BioScrew; Linvatec, Largo, FL) in May 1999. Three months after ACL reconstruction, systemic allergic symptoms were observed, such as restlessness/nervousness, inability to focus mentally, packed sinuses, facial swelling, memory loss, rash on the upper right leg, water retention, chronic fatigue, decreased sex drive, and localized alopecia. One biodegradable PLLA screw was ground into powder, and an antigen/serum was made by use of PLLA screw powder and saline solution. The solution was then diluted into different strengths, ranging from 1 to 8. After a placebo injection, to rule out psychosomatic behavior, the patient’s skin was tested

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0749-8063/08/2406-6632\$34.00/0
doi:10.1016/j.arthro.2006.12.029*

with the PLLA antigen. An allergic reaction developed immediately, involving eye tearing, sleepiness, and difficulty breathing. All symptoms disappeared 20 minutes after the antigen injection. The patient's antigen end-point was 6 (very high), confirming a connection between his symptoms and the screw/PLLA antigen. From that time point, he was given the No. 6 antigen once per day, in an effort to slow down his symptoms. The PLLA end-point decreased to 3; his overall symptoms were much improved but did not stop. At 15 months after ACL reconstruction (August 2000) and 12 months after the onset of allergic symptoms, one biodegradable PLLA screw was removed. The patient's antigen end-point dropped from 3 to 1 on the first postoperative day. Two weeks after surgery, there was improvement of all allergic symptoms, especially restlessness/nervousness, inability to focus mentally, chronic fatigue, decreased sex drive, and localized alopecia.

The patient continued to take the PLLA antigen until he presented to our department 26 months after ACL reconstruction (July 2001), complaining of instability. He underwent arthroscopic revision ACL reconstruction with hamstrings via press-fit fixation without the need for any implant.¹ The old loose graft was completely removed, and both tunnels were carefully debrided and curetted up to good cancellous bone. No remnants of the second bioabsorbable PLLA screw could be seen macroscopically.

One month postoperatively, the patient showed significant improvement in energy levels and a large memory gain, and he reported digestive improvement and disappearance of facial puffiness. His sex drive had returned, and his asthma signs had disappeared. According to the allergy testing, the PLLA end-point dropped to "concentrate."

Four years after revision ACL reconstruction, the patient's health status is normal, without any allergic symptoms. His laboratory findings returned to normal.

DISCUSSION

Biodegradable PLLA interference screws are used for fixation of bone to bone or tendon to bone in ACL reconstruction with good results.² However, the duration of the biodegradation of the PLLA material is still unpredictable. It seems to take more than 2 years to

dissolve. It is also reported that, microscopically, parts of the biodegradable PLLA screws may be integrated into the synovial tissue of the joint and the scar tissue around the bone tunnels.³

Some rare complications have been reported with the use of biodegradable PLLA material, such as synovitis and local foreign-body reactions. All symptoms subsided after removal of the biodegradable material, as well as all of the scar tissue around it, by means of debridement and arthroscopic irrigation.^{4,5}

This case shows that biodegradable PLLA screws might cause a systemic allergic reaction, as proven by (1) positive allergy tests and (2) subsiding of the intensity of symptoms and positive allergy tests after all of the material had been removed, with care taken to clear all scar tissue around the bone tunnels, including the sclerotic tunnel wall. This seems to be the only way to get rid of all remnants of the biodegradable PLLA screws and subsequently eliminate the patient's symptoms. In our case the patient did not have any signs of synovitis, so there was no need to perform extensive synovectomy.

To our knowledge, there is no report in the literature of a systemic allergic reaction to biodegradable PLLA screws after ACL reconstruction. Therefore we believe that one should be aware of this complication and treat it adequately by complete debridement, once the allergic action of PLLA has been proved with special allergy tests.

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