

# **PLATELET-RICH PLASMA FOR TREATING PAINFUL DISTAL SEMIMEMBRANOSUS TENDINOPATHY IN A PATIENT WITH PROLONGED ALENDRONATE USE**

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**Background:** Long-term alendronate use has been associated with tendinopathies and ligament disorders that may result in chronic pain and functional impairment. Platelet-rich plasma (PRP) therapy has emerged as a regenerative treatment option for chronic tendinopathies by promoting tissue healing and improving pain and function.

**Case Report:** A 61-year-old woman with an athletic lifestyle took alendronate for 14 years for osteopenia before she stopped taking it. Nine years later, she reported chronic right hamstring complex pain and loss of function after sustaining a lifting injury. She underwent conservative therapy, including stretching exercises and physical therapy and had an evaluation by an orthopedic surgeon. Her pain and function did not improve. She was referred to an interventional pain management physician who diagnosed her with chronic semimembranosus tendinopathy. She was initially treated with a 3-injection series of 12.5% dextrose prolotherapy which did not provide lasting pain relief nor lasting functional improvement. Her treatment was then changed to a holistic regimen of ultrasound-guided leukocyte-poor platelet-rich plasma injections, a post platelet-rich plasma physical therapy program, and acupuncture. This holistic treatment program enabled her to attain 90%-95% pain relief and a significantly improved functional status and quality of life.

**Conclusion:** Platelet-rich plasma injection therapy is an evolving area in Medicine. It holds much promise for those in need of musculoskeletal repair, pain relief and improved function without the need for surgery or chronic use of medications. Much work remains to be done in developing more standardization of platelet-rich plasma therapy, but medical specialists are moving in the right direction as we become more sophisticated and attune in studying, understanding and implementing the potential that platelet-rich plasma injection therapy holds for healing. Incorporation of leukocyte-poor platelet-rich plasma using holistic treatment of chronic semimembranosus tendinopathy associated with chronic use of alendronate was much more effective for pain reduction and restoration of function as compared to only more conservative therapies of physical therapy, stretching exercises, acupuncture, and dextrose prolotherapy.

**Key words:** Platelet-rich plasma, alendronate, bisphosphonates, prolotherapy, tendinopathy

## **BACKGROUND**

Bisphosphonate use has been linked with the formation of tendinopathies and ligament damage in patients who used this medication as an osteoporosis prophylaxis, and for treating osteoporosis, osteopenia, and bone me-

tastasis from cancer. The bisphosphonate found to have the highest association with tendinopathies and ligament disorders is alendronate (1). Chronic tendinopathies and ligament disorders cause pain and joint dysfunction which lead to chronic pain, decreased functional status,

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and decreased overall quality of life. Platelet-rich plasma (PRP) has emerged as a safe and successful treatment for chronic tendinopathies. It promotes tendon healing by using the body's own healing powers. It has been shown that PRP is most effective when it is part of a holistic chronic pain management and functional restoration program for many musculoskeletal disorders (2,3).

### CASE PRESENTATION

A 61-year-old woman with an athletic lifestyle was referred to our pain clinic by an orthopedic surgeon for right posterior leg pain (Figs. 1, 2). Eight months before

being referred, this surgeon had performed a right total knee arthroplasty due to her advanced knee osteoarthritis and pain.

Our evaluation included a medical history, a detailed physical examination, and a review of her imaging. Her history revealed that this pain began almost one year ago after she picked up a bucket of water and heard a "pop"; this was associated with the immediate onset of pain in her medial right hamstring muscle above her popliteal fossa. She reported that since this incident, she had had severe pain with climbing steps, walking for any prolonged distance, and with attempting to put on a pair of pants.

She had tried ice therapy, physical therapy, stretching exercises at home, and underwent acupuncture treatment, but had no lasting relief or functional improvement. On physical examination, she had a thick "ropy" right semimembranosus tendon to palpation and experienced sharp pain to deeper palpation. Power was grossly intact and normal in both lower extremities. Her gait was normal but walking for approximately 300 feet caused discomfort over her right medial hamstring musculature about 2 inches cephalad to the inferior border of her popliteal fossa. I performed a musculoskeletal ultrasound exam and palpation over her right medial lower extremity and found that her pain's origin was the right distal semimembranosus tendon. We reviewed the magnetic resonance imaging (MRI) of the right femur, the right lower extremity, and the

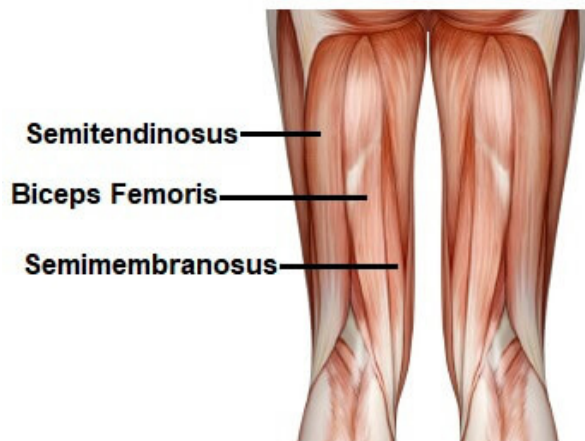


Fig. 1. Posterior thigh compartment muscles and tendons.

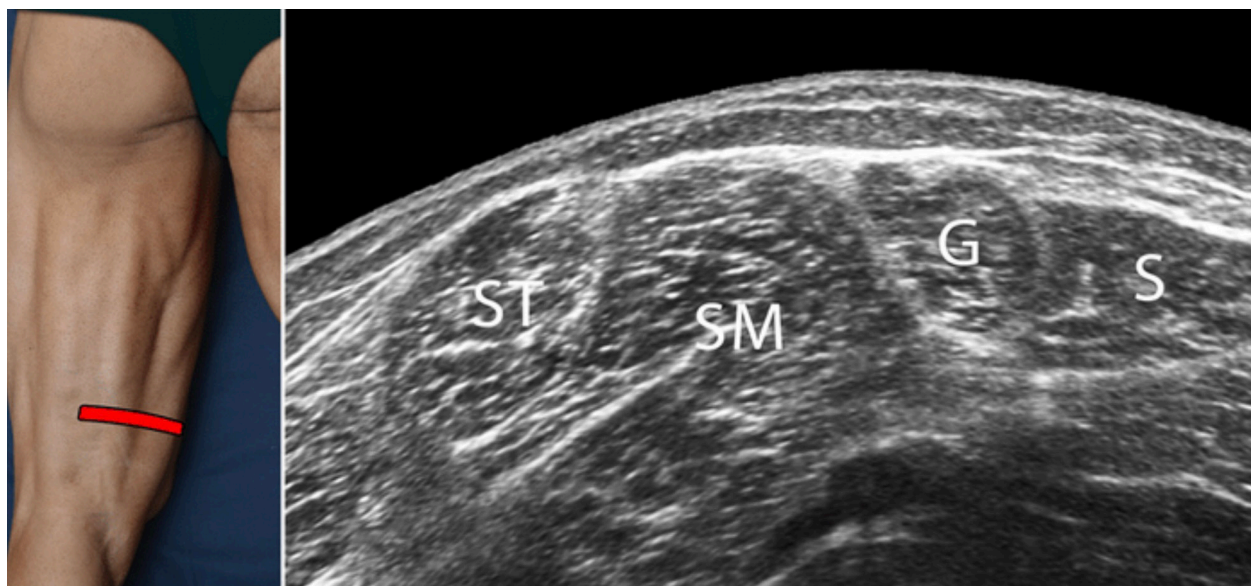


Fig. 2. Posterior thigh compartment muscles.

right knee, as well as x-rays of the right femur and the postoperative right knee.

The MRI of the right femur without a contrast medium obtained at 6-months postsurgery showed, quoting from the radiologist's report, a "probable partial avulsion of the right common hamstring tendon origin at the right ischial tuberosity. No abnormal signal within the thigh musculature. Ligamentous, tendinous and cartilaginous structures are otherwise unremarkable. In the marrow space of the distal portion of the femur, there are multiple irregularly shaped lesions that are of mostly low T1 and high T2 signal intensity suggestive of bone infarcts."

The MRI of the lower right leg with and without gadolinium contrast medium obtained at 8-months postsurgery showed, again quoting from the radiologist's report, "unremarkable visualized portions of the biceps femoris and IT [iliotibial] band, no clear evidence for acute bony abnormality and scattered T1 and T2 hypointense foci along the suprapatellar superficial soft tissue surgical margins consistent with postsurgical changes/scar. Changes from right total knee arthroplasty seen. Susceptibility artifacts from implanted hardware severely decreased this exam's sensitivity."

The MRI of the right knee obtained at 7-months postsurgery was read as "status post total knee arthroplasty and no evidence of distal hamstring injury."

The x-ray of the right femur obtained at 6-months postsurgery was read as "negative for any failure of the right total knee arthroplasty, for any lytic or blastic lesions, or for any acute fracture or dislocation."

The immediate postoperative x-ray of the right knee showed "unremarkable right knee replacement."

I discussed this case and the imaging studies in detail with the referring orthopedic surgeon and a radiologist at our institution. I ordered a formal musculoskeletal ultrasound study of the patient's right lower extremity at a nearby university medical center. This formal ultrasound study noted, according to the report, "increased echogenicity and loss of muscle architecture involving the semimembranosus muscle belly at the myotendinous junction located approximately 5 cm proximal to its insertion. Findings are compatible with grade 1 to grade 2 strain." Furthermore, per her medical history, she had received a 14-year uninterrupted course of alendronate that was stopped 10 years earlier due to a bone density test reportedly (per the patient) showing evidence of osteopenia. More detailed records and patient recollection regarding dosing and re-prescribing were unavailable.

Upon being diagnosed with chronic semimembranosus tendinopathy, she underwent 3 series of 12.5% dextrose prolotherapy injections spaced approximately 14–16 days apart. Each series consisted of 1–1.5 mL of 12.5% dextrose prolotherapy solution at 3–6 painful sites of her right semimembranosus tendon. The injections were performed by the landmark technique since her painful sites were superficial and easily accessible and familiarity of the involved anatomy was present from my prior musculoskeletal diagnostic ultrasound exam. After each prolotherapy injection, she reported only one day of pain relief and improved physical functioning. Furthermore, there were no morphological changes noted to palpation of her tendon when she was examined on subsequent clinic visits. Her tendon remained thickened, "ropey," and tender to deeper palpation.

At this point, the referring orthopedic surgeon and I discussed performing a PRP injection since the prolotherapy injections had not helped. He and I reviewed her case again and he wished to exhaust all standard medical treatments before progressing to a PRP injection. He reviewed an MRI of her lumbar spine that this patient obtained 10 months before she came to our pain clinic. According to the MRI report, she had "marked multilevel degenerative changes throughout the lumbar spine, multilevel lumbar spinal canal stenosis, and dextroscoliosis centered at L1-2. At the L1-2, L2-3, L3-4 and the L4-5 levels, lumbar disc bulges were present along with multilevel moderate to severe bilateral neuroforaminal stenosis."

The surgeon asked me to perform a lumbar epidural steroid injection before considering a PRP injection to rule out the possibility of the lumbar spine as the origin of her pain. I obliged and performed an L5-S1 lumbar epidural steroid injection using 10 mg preservative-free dexamethasone and a preservative-free sterile saline solution. There was no local anesthetic added to the injectate. At 7 days postinjection, our patient reported no pain relief and no functional improvement.

Approximately 3 weeks post the lumbar epidural steroid injection, under in-plane ultrasound guidance, I performed a leukocyte-poor PRP injection into her right medial semimembranosus tendon which was located approximately 2 inches cephalad from the inferior border of the right popliteal fossa. A centrifuge using the supraphysiologic double-spin technique with 60 mL of blood was drawn from the patient in a 60 mL syringe. I injected 9 mL of the formed PRP injectate

(approximately 10 billion–12 billion platelets) into the tendon site with a 21G x 4-inch ultrasound needle without incident (Fig. 3). After the injection, I gave her instructions for avoiding certain medications that would affect platelet function (3). She was also taken to our physical therapist to undergo her first therapy session and was shown home exercises specifically created for patients who received a PRP injection (3). She followed-up with our physical therapist several times in person over the coming weeks. No problems or issues arose.

Instructions provided were as follows (3): no aspirin or nonsteroidal anti-inflammatory medications for 2–6 weeks postinjection. One or 2 tablets of 500 mg acetaminophen up to 3 times per as needed for discomfort. Heat could be applied to the injection site for 10 minutes up to 3 times per day. During the 3-day recovery phase, she was instructed to rest and not perform any strenuous physical activity. Limited walking on a flat surface was permitted. On postoperative days 4–14, gentle range of motion exercises and stretching exercises for 5 minutes 3 to 5 times per day were permitted. On days postoperative days 7–14, light strengthening and low intensity cardiovascular exercises were advised. She was advised to do these exercises 3 times per day. Walking and/or gentle pedaling on a stationary bicycle was allowed daily. On postoperative weeks 3–6, she returned to physical therapy for a re-evaluation to improve

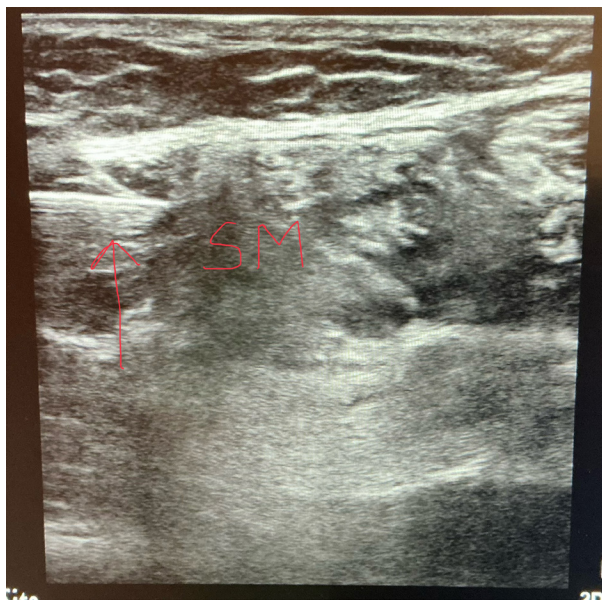


Fig. 3. Ultrasound image depicting needle insertion of the first PRP injection.

strength, endurance, proprioception, and balance. Aerobic exercises were also slowly increased—walking, bicycling, and swimming. At the 6-week postoperative mark, gentle jogging was allowed. After 6 weeks, restrictions were lifted.

Two weeks post the PRP injection, she told me that she was significantly improved. She reported “30% less pain” and improved function. She could climb 2 flights of stairs without incapacitating pain. On examination, she had much less “ropiness” to palpation of her right semimembranosus tendon and less pain to deeper palpation.

Eight weeks after the platelet-rich plasma injection was performed, the patient returned to the Pain Clinic and stated that she was able to go on a 2 mile hike and not experience much pain or functional restrictions. She also stated that she could climb steps with much less pain than before the injection and reported that she was “55-60% better” in terms of pain relief.

I saw the patient back 12 weeks after the platelet-rich plasma injection and she was very pleased—she reported “60% pain relief” and that her quality of life has significantly improved. She did report her pain as “having a bit more achiness” when it occurred but not the sharp, severe limiting pain prior to the injection. She stated that the pain was in the right semimembranosus tendon as before with no change in location. On exam, she had much less “ropiness” but still had some tenderness to deeper tendon palpation. We talked about possibly performing another PRP injection and she was in favor. Of note is that I discussed this case at this time with her referring orthopedic surgeon and he was very pleased with her progress.

Six months post the initial leukocyte-poor PRP injection, I performed a second in-plane ultrasound-guided leukocyte-poor PRP injection into her right semimembranosus tendon (Fig. 4). I used a total of 10 mL of injectate prepared in the same manner as the first injectate was prepared, again with approximately 10 billion–12 billion platelets used. She was not able to see the physical therapist immediately that day but was soon contacted by the physical therapist and given many of the same postinjection therapy instructions (3). I provided the same medication avoidance list to her (3).

On the patient’s 4-month follow-up, she reported that she was “90%–95% better” with pain relief and functioning. She resumed her former athletic activities with only occasional tightness in her right semimembranosus tendon.

Of importance is that she gave informed consent

for each of the modalities that were employed in her treatment. She also underwent scraping therapy by a physical therapist and acupuncture treatments; she felt that these treatments were helpful. On examination, the patient's right semimembranosus tendon felt supple and smooth. No "ropiness" was detected—there was a morphologic change to her tendon on palpation. There was no pain to deeper palpation of the tendon. She also reported that she was continuing to do home stretching exercises because she felt they were beneficial. Overall, she regained a much higher quality of life after PRP injection therapy was added to her treatment regimen.

## DISCUSSION

Platelet-rich plasma injection therapy is an evolving area in Medicine. Based on many of the reports (2,4-7), it holds much promise for those in need of musculoskeletal repair, pain relief, and improved function without the need for surgery or chronic use of medications. There is much work that remains to be done in developing more standardization of PRP injection therapy, but medical specialists are moving in the right direction as we become more sophisticated and accustomed to studying, understanding, and implementing the potential that PRP injection therapy holds for healing (8).

## CONCLUSION

Distal semimembranosus tendinopathy is an uncommon finding (9), especially if there is an association with

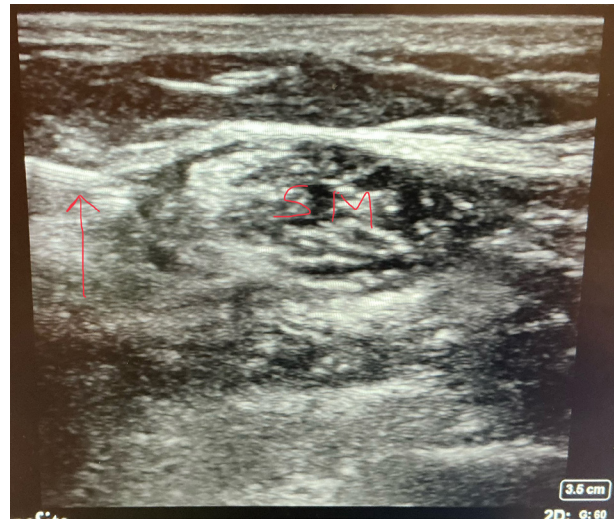


Fig. 4. Ultrasound image depicting needle insertion of the second PRP injection.

chronic use of alendronate (1). Because of this rarity, the standard of care is based on how other tendinopathies are treated and the physician's clinical acumen (9). This case study illustrates that the most effective treatment for distal semimembranosus tendinopathy associated with long-term use of alendronate is multimodal: PRP injections, physical therapy, and acupuncture in this particular instance.

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