# Discussion: Autologous Fat Transfer for Thumb Carpometacarpal Joint Osteoarthritis: A Prospective Study

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Osteoarthritis of the thumb carpometacarpal joint, a common ailment, can be treated with autologous fat transfer. Our own clinical experience over the past 5 years with over 100 cases corroborates the findings of Herold and colleagues.[1] We congratulate the authors for sharing their experience and thank the *Journal* for publishing their series.

Although the results might be sometimes impressive, fat grafting is not a panacea. We also realized that in more advanced disease, the procedure is less effective. When the joint space is lost, there is no room to inject the fat. We therefore recently added external joint distraction to our treatment protocol of grade III to IV thumb carpometacarpal joint osteoarthritis. Under local anesthesia, we recreate the joint space and correct the dislocation with an external distractor applied with Kirschner wires. Then, under fluoroscopic guidance, with an 18-gauge needle, we inject 3 ml of Telfa (Covidien, Mansfield, Mass.) paper-rolled lipoaspirate obtained by simple tumescent liposuction. We keep the distractor for 2 weeks and then splint the thumb for 1 additional week. The patient resumes normal activity on the third postoperative week. At 6-month follow-up, all patients in our series of 15 grade III to IV carpometacarpal joint osteoarthritis patients treated with autologous fat transfer plus external joint distraction have radiographic preservation of the joint space and are completely asymptomatic (Fig. 1). A 3-month postoperative magnetic resonance imaging scan shows an extensive soft-tissue buildup in and around the joint but no clear evidence of viable fat.

Fat is a readily available autologous spacer that can be simply harvested and injected into the joint with essentially no morbidity. For more advanced cases, autologous fat transfer plus external joint distraction is an attractive alternative for patients not willing to suffer the prolonged immobilization of the trapeziectomy, suspension arthroplasty, and tendon interposition procedures. Two months of continuous external joint distraction without autologous fat transfer has shown some efficacy in treatment of osteoarthritis of the knee[2,3] and the thumb carpometacarpal joint[4]; however, 2 months of distractor immobilization approaches that of more invasive operations. Autologous fat transfer plus external joint distraction is a minimally invasive technique with only a 3-week immobilization period that could expand the available treatment methods for carpometacarpal joint arthritis to include advanced cases without burning any bridges.

Widespread adoption of this potential breakthrough is limited by the lack of consensus on the underlying mechanism and the absence of high-quality clinical evidence. With regard to the underlying mechanism, there are three potential explanations. First, the injected fat acts as a cushion between the bones. This explanation is unlikely because a bolus of fat does not survive in the arid joint space, and follow-up magnetic resonance imaging showed no intraarticular fat. In addition, injection of inert biological substances, such as hyaluronic acid, have been shown to be ineffective in the treatment of osteoarthritis.[5,6] Second, the antiinflammatory[7] and nerve pain–soothing[8] effects of autologous fat transfer improve the symptoms without treating the underlying abnormality. Third, adipose-derived stem cells in the autologous fat transfer differentiate into chondrocytes or induce the formation of a connective tissue spacer through some paracrine mechanisms. A combination of these explanations may also be involved. Consensus on the exact underlying mechanism will require further basic science investigation. Fortunately, many clinically successful treatments have been adopted long before we understood the intricacy of their mechanism of action.

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*Received for publication March 19, 2017; accepted March 27, 2017.*

DOI: 10.1097/PRS.0000000000003567

**Disclosure:** *Roger K. Khouri has equity interest in LipoCosm. Roger K. Khouri, Jr., has no conflicts of interest to disclose.*

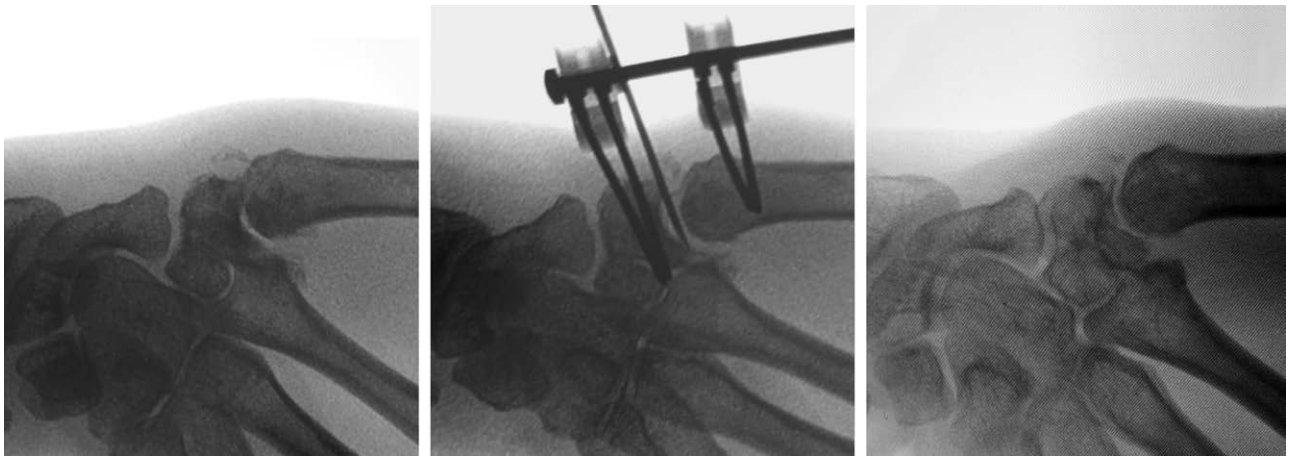

**Fig. 1.** (*Left*) Preoperative radiograph shows subluxation and destruction of the carpometacarpal joint with significant osteophytes and loose bodies. (*Center*) Intraoperative view with distractor reducing the joint and recreating a joint space. The 18-gauge needle is injecting the fat into the joint. (*Right*) A 6-month postoperative radiograph demonstrates preservation of articular congruity and regeneration of the joint space.

We have to start somewhere. Prospective, controlled, randomized, clinical trials cannot be ethically or financially justified without some published preliminary evidence of efficacy and safety. Similarly, we initially presented the percutaneous aponeurotomy and lipofilling procedure for Dupuytren contractures as part of a case series.[9,10] After some evidence of safety and efficacy had been established, we collaborated with academic colleagues in Rotterdam to conduct a large, prospective, randomized, controlled clinical trial that confirmed the efficacy.[11] Therefore, we strongly encourage hand surgeons in large academic centers to collaborate and initiate these studies.

The rewards to our patients are great. Our Dupuytren experience with the percutaneous aponeurotomy and lipofilling demonstrates that our aging population longs for more simple effective procedures. There is no stopping the trend. Surgeons will continue to replace invasive extirpative surgery with minimally invasive regenerative procedures. Autologous fat transfer is a disruptive technology with regenerative capabilities. However, stem cell hype aside, autologous fat transfer costs next to nothing. With no financial incentive for major drug or device companies to fund its research or promote it, fat is an orphan. Patient advocate surgeons have to stand up as surrogates.

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## REFERENCES

1. Herold C, Rennekampff H-O, Groddeck R, Allert S. Autologous fat transfer for thumb carpometacarpal joint osteoarthritis: A prospective study. *Plast Reconstr Surg.* 2017;140:327–335.
2. Intema F, Van Roermund PM, Marijnissen AC, et al. Tissue structure modification in knee osteoarthritis by use of joint distraction: An open 1-year pilot study. *Ann Rheum Dis.* 2011;70:1441–1446.
3. Wiegant K, van Roermund PM, Intema F, et al. Sustained clinical and structural benefit after joint distraction in the treatment of severe knee osteoarthritis. *Osteoarthritis Cartilage* 2013;21:1660–1667.
4. Spaans AJ, Minnen LP, Braakenburg A, Mink van der Molen AB. Joint distraction for thumb carpometacarpal osteoarthritis: A feasibility study with 1-year follow-up. *J Plast Surg Hand Surg.* 2016:1–5. [Epub ahead of print]. doi: 10.1080/2000656X.2016.1241789.
5. DeGroot H III, Uzunishvili S, Weir R, Al-omari A, Gomes B. Intra-articular injection of hyaluronic acid is not superior to saline solution injection for ankle arthritis: A randomized, double-blind, placebo-controlled study. *J Bone Joint Surg Am.* 2012;94:2–8.
6. Lester DK, Zhang K. Gait analysis of knee arthritis treated with hyaluronic acid. *J Arthroplasty* 2010;25:1290–1294.
7. ter Huurne M, Schelbergen R, Blattes R, et al. Antiinflammatory and chondroprotective effects of intraarticular injection of adipose-derived stem cells in experimental osteoarthritis. *Arthritis Rheum.* 2012;64:3604–3613.
8. Lee HY, Lee HL, Yun Y, et al. Human adipose stem cells improve mechanical allodynia and enhance functional recovery in a rat model of neuropathic pain. *Tissue Eng Part A* 2015;21:2044–2052.
9. Khouri RK, Smit JM, Cardoso E, et al. Percutaneous aponeurotomy and lipofilling: A regenerative alternative to flap reconstruction? *Plast Reconstr Surg.* 2013;132:1280–1290.
10. Hovius SE, Kan HJ, Smit X, Selles RW, Cardoso E, Khouri RK. Extensive percutaneous aponeurotomy and lipografting: A new treatment for Dupuytren disease. *Plast Reconstr Surg.* 2011;128:221–228.
11. Kan HJ, Selles RW, van Nieuwenhoven CA, Zhou C, Khouri RK, Hovius SE. Percutaneous aponeurotomy and lipofilling (PALF) versus limited fasciectomy in patients with primary Dupuytren's contracture: A prospective, randomized, controlled trial. *Plast Reconstr Surg.* 2016;137:1800–1812.