

A Novel Technique for Joint Preserving Surgical Management of Early Stage Osteoarthritis of the Metatarsophalangeal Joint: A Case Series

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Background

Osteoarthritis (OA) of the first metatarsophalangeal joint (MTPJ) is a degenerative joint disease characterized by pain and stiffness of the joint. It is the most common arthridity found in the foot and affects about 2.5% of patients over fifty years of age. Coughlin and Shurnas were able to classify the progression of the disease based on clinical and radiographic findings which has largely guided treatment. First MTPJ arthrodesis has become the gold standard for late stage OA, while early OA treatment is still debatable. In early OA, joint salvage procedures are preferred. Cheilectomy of the joint is very successful and can provide considerable relief but can also exacerbate symptoms if any cartilage damage is present. Joint replacement with metal versus silastic implants have shown to have a high failure rate.

We present an innovative product that has been designed to reconstruct the foundation of a joint made from strong alloy "titanium" and is coated with hydroxyapatite, which assists in rapid bone remodeling of subchondral bone that is threaded. The objective of this study is to present a new technique to treat early osteoarthritis (OA) of the metatarsophalangeal joint (MTPJ) with an innovative threaded titanium implant that is joint preserving. The authors hypothesize it can reduce postoperative pain.

Methods

Seven patients with early stage OA of the MTPJ underwent joint sparing surgical treatment by a single surgeon. The MTPJ was opened and the cartilage defect was identified and debrided with a custom reamer. The defect was then fitted with a threaded implant made of titanium alloy and hydroxyapatite. Dermal graft was attached to the surface of the implant prior to implantation if significant cartilage loss was noted. Postoperatively, patients were WBAT in surgical shoe for 3 weeks, begin PT at 3 weeks, and return to full activity at 7 weeks. Pre and post op visual analog scales (VAS) were collected retrospectively.

Age/Gender	Pre-op Pain Score 0-10/10	First Post-op Pain Score (5-14 days)	Second Post-op Pain Score (7-44 weeks)	# Weeks Post-op of Last Pain Score	Size of Implant (mm)	Used Dermal Allograft	Concomitant Procedure
61M	5	3	3	24	7	Y	1st MTPJ Cheilectomy
54F	5	2	1	28	4	N	5th MTPJ Cheilectomy
60M	4	0	0	44	7	Y	1st MTPJ Cheilectomy
64M	7	3	0	16	6	Y	1st MTPJ Cheilectomy
64F	8	3	0	7	9	Y	1st MTPJ Modified Valenti arthroplasty
58F	5	2	2	7	5	N	1st MTPJ Modified Valenti arthroplasty
54M	6	1	0	3	9	Y	1st MTPJ Modified Valenti arthroplasty



Figure 1 portrays preoperative XR, Figure 2 is 2 weeks post-op, Figure 3 is 12 months post op

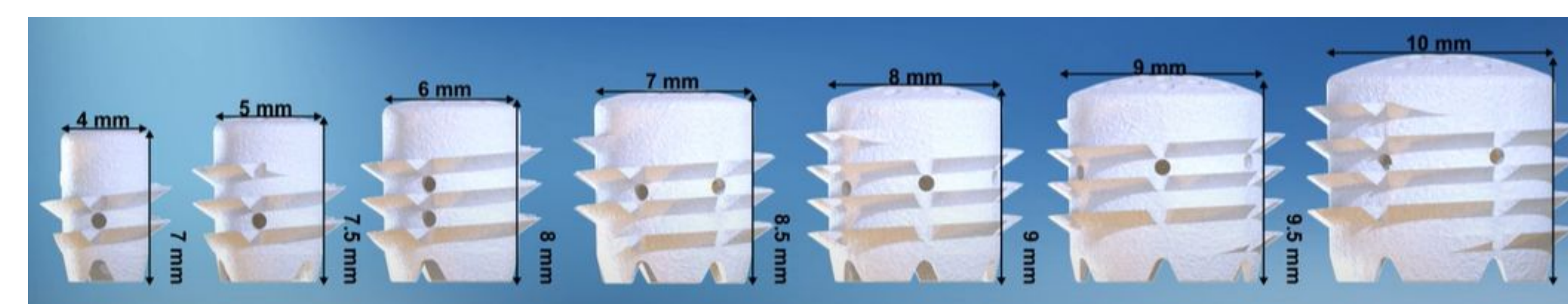
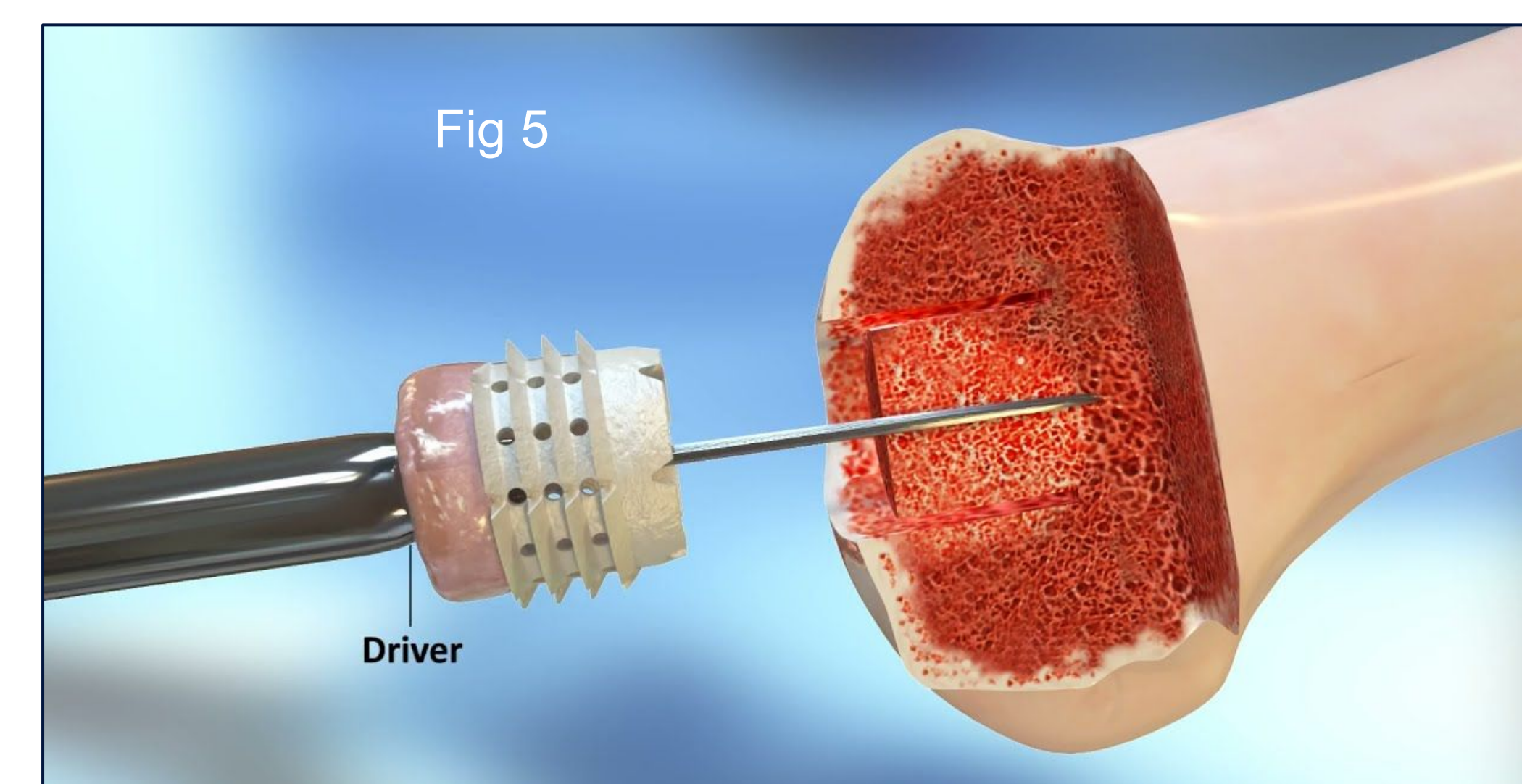
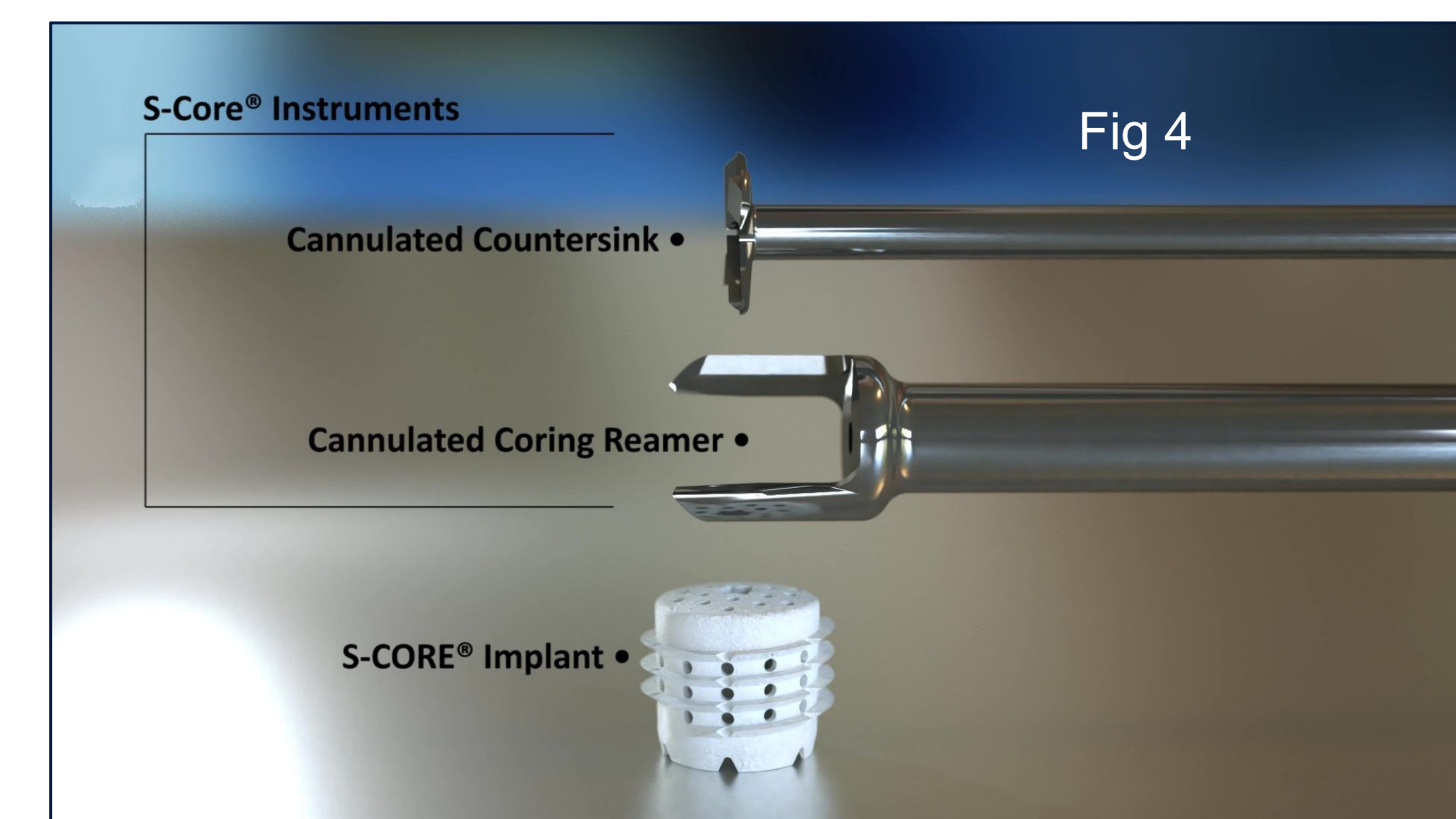


Figure 4: Demonstrating all the instruments included into the kit for the implant. Figure 5: Demonstration of application of the implant into the first metatarsal bone through the guide wire

Results

We present 7 patients that had the procedure, 5 of which had a dermal graft application. The average follow up time was 18.43 weeks, respectively. All patients demonstrated a significantly improved VAS scores at their first post op 5.714 (p-value=.0001) and at future follow up visits 0.85 (p-value=.0002). When comparing patients who had the dermal graft applications versus those who didn't, no significant difference was appreciated with a P-value >0.05. There were no postoperative complications or additional surgery noted.

Discussion and Conclusion

Joint salvage is recommended in early OA of the MTPJ. Cheilectomies and shortening osteotomies can provide a degree of relief but can also exacerbate symptoms if cartilage injury is present. Current implantable devices have shown high incidence of complications and low survivability. This study provides support that this new implant has improved postoperative pain without complication.

This study introduces a new and safe technique to treat OA of the MTPJ, especially with osteochondral lesion, with a stable titanium implant that can be open or minimally invasive. Although this report demonstrated positive outcomes with this surgical approach, there are limitations included limited follow up time as well as subject number. It would be interesting to compare this surgical option

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