NeoMTX™
Case Series

EXTREMITY MEDICAL

Prospective Clinical Evaluation of NeoMTX™ Viable Bone Matrix in Foot and Ankle Arthrodesis

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Introduction

Achieving reliable fusion in the foot and ankle continues to be a challenge in reconstructive surgery due to the biologic complexity of the attempted joint fusion site. Midfoot, hindfoot, and forefoot arthrodesis procedures are performed to correct deformity, resolve pain, restore stability, and/or address the consequences of failed prior reconstruction. Autologous bone graft has long been considered the benchmark due to its ability to provide structural support, osteoinductive signaling, and viable osteogenic cells. However, its clinical use is constrained by donor-site morbidity, limited quantity, and patient-specific variability that may compromise graft quality[1].

NeoMTX™ viable bone matrix was designed to provide a clinically viable alternative to autograft by preserving native bone architecture, signaling molecules, and viable donor-derived cells without the use of carriers, fibers, synthetic additives, or DMSO. Derived from screened vertebral body donors under 55 years of age (median donor age: 35 years), the graft contains a mineralized bone matrix enriched with physiological levels of growth factors including BMP-2, BMP-7, BMP-9, VEGF, PDGF-BB, and FGF-2. These factors are well recognized for their roles in angiogenesis, progenitor cell recruitment, osteoblastic differentiation, and the cascade of bone repair. In addition, NeoMTX retains viable vertebral bone–adherent (vBA) cells, containing approximately 2 million viable vBA cells per cubic centimeter, and maintains greater than 70% cell viability following thawing and implantation.[1],[2]

The present white paper describes the clinical and radiographic outcomes of a prospective evaluation conducted by two surgeons, together enrolling 36 consecutive patients undergoing foot and ankle arthrodesis procedures. The goal of this analysis was to characterize the performance of NeoMTX across a wide range of procedures, including midfoot, hindfoot, and forefoot cases, and to assess the effect of NeoMTX in patients that may have significant systemic comorbidities. This report provides a comprehensive summary of clinical outcomes, radiographic union rates, procedural characteristics, and the overall performance of NeoMTX in foot and ankle surgery.

Methods

This prospective study included 36 consecutive patients treated by two experienced foot and ankle surgeons. All patients were indicated for arthrodesis of the forefoot, midfoot, hindfoot, or ankle and were medically evaluated to ensure they could safely undergo surgery and comply with postoperative follow-up. Patients were excluded only if they had an active infection at the operative site, a known allergy to antibiotics contained in NeoMTX, a diagnosis of Charcot arthropathy, or if they required grafting material other than NeoMTX supplemented with local autologous bone or freeze dried allograft wedges used for structural defects.

Standard surgical techniques for arthrodesis were used in all cases, including complete removal of cartilage, preparation of subchondral bone, and optimization of bone-to-bone contact. The NeoMTX graft was packed thoroughly into each prepared arthrodesis site before applying fixation. Fixation was selected at the discretion of each surgeon based on anatomy, deformity severity, and overall reconstructive objectives. Radiographs were obtained preoperatively, immediately postoperatively, and at routine follow-up intervals of approximately 6 weeks and 12 weeks. Computed tomography (CT) was performed beyond the 6-month mark to further evaluate osseous consolidation if healing was in question. Radiographs were assessed by an independent surgeon reviewer to confirm successful unions.

Results

Thirty-six patients underwent fusion procedures utilizing NeoMTX, representing a wide range of surgical indications across the forefoot, midfoot, hindfoot, and ankle. Procedures included first metatarsophalangeal, tarsometatarsal, naviculocuneiform, subtalar, triple, and tibiotalocalcaneal (TTC) arthrodeses.

The patient population was medically diverse, and many individuals carried systemic conditions that are known to impair bone healing. These included diabetes, rheumatoid arthritis, multiple sclerosis, osteoporosis, and more. A complete list of medical comorbidities within the patient population is described in Table 1.

Table 1: Summary of Patient Procedures, Comorbidities, and Fusion Results

Pt #	Procedure (Fusion)	Medical Comorbidities	Union confimed
1	MTPJ Arthrodesis	None	YES
2	TMT 1,2,3 Arthrodesis	None	YES
3	STJ Arthrodesis	None	YES
4	MTPJ and TMT 2,3 Arthrodesis	None	YES
5	STJ Arthrodesis	None	YES
6	Triple Arthrodesis	Multiple Sclerosis, Prednisone, Osteoporosis	YES
7	2nd TMT Arthrodesis	Anti-rheumatic medications	NO
8	NC and TMT 3 Arthrodesis	Anti-Rheumatic	YES
9	STJ Arthrodesis	Diabetes	YES
10	STJ Arthrodesis	Rheumatoid	YES
11	STJ and 1st TMT Arthrodesis	IDDM, RA	YES
12	STJ Arthrodesis	Hypothyroid	YES
13	MTPJ Arthrodesis	Revision Surgery	YES
14	MTPJ Arthrodesis	Revision Surgery	YES
15	STJ Arthrodesis	None	YES
16	MTPJ Arthrodesis	None	YES
17	STJ Arthrodesis	Multiple Sclerosis, Prednisone	YES
18	MTPJ Arthrodesis	None	YES
19	MTPJ Arthrodesis	None	YES
20	STJ and TN Arthrodesis	None	YES
21	STJ Arthrodesis	None	YES
22	STJ and TN Arthrodesis	HTN, Afib	YES
23	NC Arthrodesis dowel technique	Lumbar spondylosis, SI joint inflammation, hip OA	YES
24	STJ Arthrodesis	BPH, cataracts, hypercholesterolemia, pulmonary emphysema, RLS	YES
25	STJ Arthrodesis	ADHD, cataracts, Degenerative disc disease, left knee meniscus tear	YES
26	TTC Arthrodesis	Afib, early onset alzheimers, hypercholesterolemia, HTN, kidney stones, history of stroke	YES
27	Realignment ankle Arthrodesis	BL knee pain, MRSA infection	YES
28	STJ and TN Arthrodesis	Diverticulitis, hypercholesterolemia, HTN	YES
29	TTC Arthrodesis	traumatic subdural hematoma	YES
30	STJ and TN Arthrodesis	neuropathy, HTM, AFib, HTN, hypercholesterolemia, BPH	YES
31	TTC Arthrodesis	CMT, DM II,	YES
32	STJ bone block arthrodesis	None	YES
33	NC Arthrodesis	Acid reflux	YES
34	TTC Arthrodesis	Anxiety, HTN, hypercholesterolemia, stroke	YES
35	TTC Arthrodesis	Prostate cancer	YES
36	TTC Arthrodesis	neuropathy, failed TAA, GERD, sleep apnea, HTN	YES

Radiographic evaluations confirmed that 35 of the 36 patients achieved osseous fusion, yielding a union rate of 97.2%. The single nonunion occurred in a patient undergoing a second tarsometatarsal (TMT) fusion. Two thirds (24) of patients that underwent arthrodesis with NeoMTX in our study had medical comorbidities. All other cases demonstrated progressive trabecular bridging and incorporation of the graft material consistent with successful arthrodesis. No complications were attributed to NeoMTX, and there were no instances of graft-related inflammation, adverse reaction, or postoperative infection traceable to the graft.

Figure 1: Radiographic evaluation of Patient 4 before and after combined MTPJ and TMT (2–3) arthrodeses. Preoperative views (1a, 1b) demonstrate degenerative changes and malalignment. Postoperative images (1c, 1d) demonstrate successful arthrodesis with restoration of alignment and stable fixation.

Figure 2: Preoperative and postoperative radiographs of Patient 28 undergoing subtalar (STJ) and talonavicular (TN) arthrodeses. Preoperative images (2a, 2b) demonstrate hindfoot deformity and joint pathology. Postoperative radiographs (2c, 2d) show restoration of hindfoot alignment and stabilization.

Discussion

The findings of this 36-patient prospective evaluation demonstrate that NeoMTX supports dependable and reproducible osseous union across a wide variety of foot and ankle fusion procedures. The 97.2% fusion rate achieved across the cohort is notable given the breadth of pathology included and the substantial proportion of patients with conditions known to compromise bone metabolism.

The biologic rationale for NeoMTX is reflected in its performance. The mineralized matrix provides a scaffold that facilitates vascular and cellular growth; the preserved osteoinductive factors—such as BMP-2, BMP-7, and VEGF—signal and support the bone regeneration cascade; and the viable vertebral bone–adherent cells contribute an osteogenic component immediately upon thawing. These attributes function synergistically to achieve the benefits of autologous bone graft while eliminating the morbidity of harvesting and the variability inherent to patient-derived graft material.

The spectrum of comorbidities within this cohort is particularly relevant. Conditions such as diabetes, chronic corticosteroid use, rheumatoid arthritis requiring immunosuppression, neuropathy, cardiovascular disease, and osteoporosis are well documented risk factors for impaired fusion3,4. The high union rate observed despite these factors suggests that NeoMTX provides a biologic environment capable of mitigating many of the challenges typically seen in complex foot and ankle arthrodesis.

Conclusion

In this prospective 36-patient evaluation involving two experienced foot and ankle surgeons, NeoMTX™ viable bone matrix achieved a 97.2% fusion rate across a comprehensive range of arthrodesis procedures, including midfoot, hindfoot, forefoot, and ankle fusions. Fusion was achieved consistently even in patients with significant medical comorbidities and in cases involving complex reconstructive demands. NeoMTX demonstrated reliable handling, biologic activity, and radiographic incorporation without graft-related complications. These results support NeoMTX as a robust and biologically active alternative to autograft for foot and ankle arthrodesis and position it as a dependable graft option for both routine and challenging reconstructive scenarios.

References

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