

Treatment of a recurring giant cell tumor of the distal radius using nanocrystalline hydroxyapatite (NanoBone® Bone Graft)

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Preoperative

The patient was a 31-year-old female who presented with an aching mass on the left distal radius. Her symptoms began two months prior and had been managed without pain medication. One year ago, she was treated at another clinic for a giant cell tumor of the left distal radius. Surgical management at that time included curettage with margin expansion and bone grafting. In the last six months she has experienced progressive pain, prompting an MRI that revealed an expansile heterogeneous mass consistent with probable recurrence of the giant cell tumor and possible aneurysmal bone cyst component. Plain X-rays confirmed multiple areas of radiolucency not seen previously.

Physical examination revealed limited range of motion but no obvious soft tissue abnormality. Repeat surgical treatment to include curettage with margin expansion and bone grafting was recommended. The decision was made to use bone graft instead of bone cement to reconstruct the distal radius in anticipation of needing further joint reconstructive surgery such as wrist fusion or arthroplasty. NanoBone SBX putty was selected based on the author's previous experience resulting in robust bone regeneration thereby facilitating any further surgery. Her prior surgeries were made from a dorsal approach, but based on current imaging findings, a volar approach was recommended for ease of exposure.



Fig. 1. Preoperative X-rays demonstrating left distal radius mass to be treated with NanoBone Bone Graft

Surgical Procedure

The patient was taken to surgery and a tourniquet inflated on the upper left arm. A volar surgical approach was used and careful dissection made down to the radius. There was definite cortical expansion and thinning. A cortical window was made and the medullary cavity was filled with abnormal tissue with a brown-red appearance. A curette and rongeur were used to debride the lesion and a powered bur used to facilitate curettage. Fluoroscopy was employed to ensure all areas of abnormality were removed. After multiple cycles of bur and curette, the cavity was copiously irrigated using hydrogen peroxide as an adjuvant. In addition, the cavity was treated with an argon beam laser for margin expansion. The medullary canal of the radius was accessed to allow haematopoietic elements to access the bone grafting site. The cavity was filled with 15ml of NanoBone SBX Putty. The tourniquet was deflated and haemostasis ensured. Gelfoam was placed over the bone graft site to protect it from adjacent neurovascular structures. Final imaging showed the cavity was filled and the bone graft was in position. It was decided that prophylactic stabilization would not be necessary. Layered closure was completed, and a sterile dressing applied.

Postoperative Course

Two weeks post-surgery, the patient's recovery was uneventful. Pain was well-controlled with Tylenol. The patient had very limited range of motion although she was somewhat limited preoperatively due to previous wrist surgeries. Gentle range of motion exercises were prescribed, but she was to remain non-weight bearing. She was provided with a brace to protect the surgical site.

Bone Graft Substitute Clinical Case Series

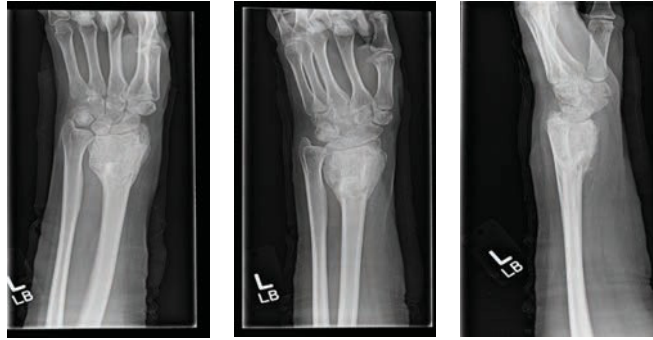


Fig. 2. 2-month X-rays demonstrating well-healed bone grafting of the distal radius with NanoBone without tumor recurrence

At two-months post-surgery, the surgical site was completely healed. Radiographs show bone grafting of the distal radius without tumor recurrence. There was some collapse at the radiocarpal joint and the volar surface resulting in slight ulnar positivity. Given the quality of the bone due to tumor destruction, there was little more that could have been done. Patient remained quite stiff at the wrist despite physical therapy.

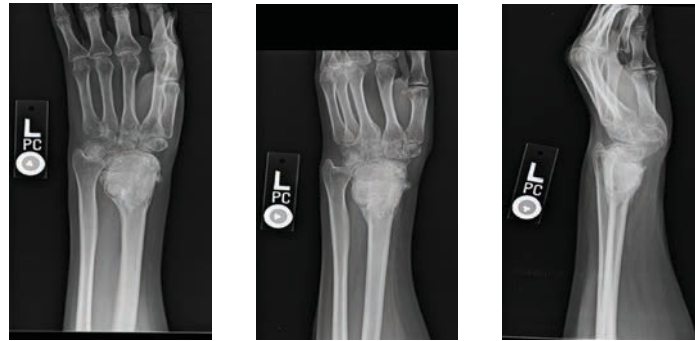


Fig. 3. 4-month X-rays demonstrating healing of NanoBone with area of lucency along ulnar border

At four-months post-surgery, patient had improvement in mobility and pain. She was more functional with the wrist but still limited in overall range of motion. Radiographs showed an area of lucency along with ulnar border that was concerning for possible tumor recurrence. She continued to demonstrate volar collapse and carpal subluxation. The reconstituted bone stock could allow future options of wrist arthroplasty or wrist fusion. At six- and nine-months post-surgery, the patient's wrist felt better despite limited motion and she was functioning well. She continued to be monitored for evidence of tumor recurrence. There was good incorporation of her bone graft. The volar subsidence noted previously appeared to have stabilized.



Fig. 4. 12-month X-rays demonstrating good incorporation of NanoBone and no evidence of tumor recurrence

At her one-year follow-up visit, there was no evidence of tumor recurrence and patient was pain-free. She had lost significant motion due to collapse through the radiocarpal joint. However, she was functioning well overall. Bone graft was fully incorporated in the wrist.