

## Use Of Free Non Vascularized Fibular Intramedullary Strut Graft As Adjunct To Dynamic Compression Plate In Severe Atrophic Fracture Non Union In Young Adult

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### Abstract

**Background:** *Operative treatment of atrophic fracture non union of long bone with the use of dynamic compression plate poses a serious challenge to orthopaedic surgeons in developing countries due to difficulty of ensuring firm purchase by the screw in the bone. Ilizarov fixator, locking plates and free vascularized fibular graft are viable options which may not be readily available due to cost and lack of expertise.*

**Patients and Methods:** *We report the use of free fibular intramedullary strut graft to bridge the fracture site in order to enhance the pull out strength of the screws of dynamic compression plate in operative treatment of severe atrophic fracture non union involving the femur and humerus in two young adults.*

**Result:** *The patients progressed to successful union of the fractures at the last follow up without recourse to additional iliac crest bone grafting.*

**Conclusion:** *Free fibular intramedullary strut graft as adjunct to dynamic compression plating in severe atrophic fracture non union of long bone is a feasible, readily available and useful option especially to surgeons in developing countries faced with this challenge.*

### Introduction

With continued patronage of traditional bone setters by patients in our environment, fracture non union of long bones has remained a common presentation to Orthopaedic surgeons practicing in Nigeria.<sup>1</sup> Most often, the predominant type of fracture non union is the atrophic variant posing a considerable operative fixation challenge to the surgeons due to the limited choice of implants available for use. The challenge is the difficulty encountered in ensuring a firm screw grip in disuse osteoporotic fractures. To overcome this problem, locking plates and use of polymethyl methacrylate screws are of considerable advantage, but high cost and availability are concerns in our country<sup>2</sup>. The Ilizarov technique is another option but expertise in its use may not be commonly available.<sup>3</sup> There is a report on the use of free fibular intramedullary strut graft as adjunct to plating of osteoporotic humeral shaft fracture non union in an elderly patient which progressed to uneventful union with out the need for additional iliac crest bone grafting.<sup>4</sup> We report the use of this technique in two young adults with severe atrophic non union of fractures of the humerus and femur who finally progressed to union without recourse to other procedures.

### Patients And Methods

Two consecutive patients with severe atrophic non

union of the femur and humerus were treated in 2009 in our centre; which is a tertiary health institution. We used free fibular intramedullary strut graft and dynamic compression plating (DCP). We defined non union as fractures which had remained un united for at least nine month in femoral fractures and 4months in humeral fractures<sup>3</sup>.

The patients underwent surgery under general anesthesia after administration of prophylactic antibiotics.

### **Preparation of The Free Non Vasclurized Fibular Graft**

The mid shaft of the fibula was harvested with care to protect the superficial peroneal nerve at the neck. The shaft of the fibular was harvested in excess length to permit trimming as may be necessary. Three sides of the fibular were trimmed so that it could telescope in the fracture fragment across the fracture sites without breaking. When the thickness of the graft did not permit its use it was conversely bevelled at two ends to leave the full thickness in the middle which can later bridge the non union site. The strut was pushed into one of the fracture fragments and the exact length of graft that needed trimming was assessed. Once the final shaping of graft was done, the fracture was reduced with intramedullary graft spanning the fracture site.

### **Case 1**

Mr AU, a 40year old security guard, a non smoker, presented 2 years after a road traffic crash injury with atrophic non union of the left femoral fracture and 3 centimeter (cm) shortening. He has been treated previously by traditional bone setters. He had no history of co-morbid medical problem. Examination revealed atrophy of left thigh with mid thigh circumference differential of 3 cm. the range of

motion at the knee was 30 degrees with pain-free mobility in the distal third of the thigh, about 6cm above the knee. The radiograph revealed non union of a distal third femoral fracture with resorption of bone ends.(Figure 1)



**Figure 1: Preoperative radiograph showing atrophic non union of supracondylar femoral fracture.**

He was operated on the 17<sup>th</sup> September 2009. Operative findings were fibrous soft tissue interposition between the fracture fragments which had rounded and friable bone ends. The medullary canals of the fractures were opened and the ends of the fragments were freshened till free bleeding was obtained Free fibular graft was harvested from the ipsilateral leg as described above. A 95 degree angled blade plate was passed appropriately in the distal fragment.<sup>6</sup> Due to the friable status of the condyles, this was secured with bone cement and osteosynthesis across the fracture site achieved with cortical screws. The immediate post operative radiograph showed good reduction (figure 2).



**Figure 2: Immediate post operative radiographs.**

The knee underwent passive joint manipulation at the end of the surgery. Patient was mobilized on non weight bearing bilateral axillary crutches till osteointegration of the fibula and fracture healing took place. Then, partial weight bearing was commenced. Serial radiographs were taken in two orthogonal planes to assess fracture healing. The fracture was taken to have united when three cortices on radiograph showed bone trabeculae across the fracture site. Union of the fracture occurred at 6months. The range of movement of the knee increased to 90 degree (Figure 3).



**Figure 3:**  
Post operative radiograph with free fibular intramedullary graft and fixed 95 degrees angled blade plate taken at six month.

### **Case 2**

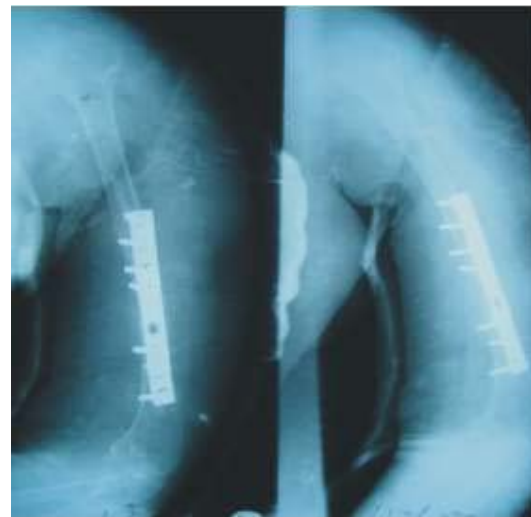
Mrs AB, a 27 year old housewife presented 8 months after road traffic injury with atrophic non union of right humeral fracture and a history of previous treatment by the traditional bone setters. There was no co-morbid medical illness. Examination revealed wasting of the right biceps and triceps muscles and stiffness of the elbow and shoulder. There was no neurological deficit.

Radiograph showed atrophic non union and resorption of end of the bone fragments. (Figure 4)



**Figure 4:**  
Radiograph showing atrophic non union of the humerus

She was operated on the 18<sup>th</sup> of October 2009. Operative finding was non union of the midshaft of right humerus with intervening soft tissue and friable bone ends. The bone ends were freshened till free bleeding was obtained and medullary cavity opened. Free fibular strut graft was placed as previously described. The immediate post operative radiograph was satisfactory (Figure 5).



**Figure 5:**  
Immediate post operative radiographs temporarily protected in U- cast

The patient had uneventful postoperative recovery and was placed on exercise therapy to increase the range of movement of the elbow and shoulder. The