

Supplementary Management of Displaced Fractures with Rush Pin in District Hospital

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Displaced fractures pose challenges to the district hospital surgeon for successful management when patient resources do not permit referral to tertiary centres. We report the use of Rush pins to aid fracture reduction and stabilization in several situations with few complications.

Key words: Displaced fracture, Rush Pin

Introduction

There has been a good program of referral of patients from district general hospitals to tertiary centers for orthopedic consultation and the management of complex injuries. However at times patient resources have precluded the smooth and timely transfer of patients and continuing to care for them in the district hospital setting has provoked additional reflection on the treatment options available. It was possible in our setting to perform open reduction of fractures and stabilize them with Rush pin fixation. As we gained experience, we found that this could be done in a variety of situations with few complications and very good functional results.

Patients and Methods

Surgical log and clinic case records were reviewed for patients treated by open reduction for displaced fractures of forearm, tibia, and humerus in a ten year period 2000- 2009 at Choma General Hospital. Complication and end results were recorded. Generally open reduction was accomplished without difficulty and Rush pins were inserted for stabilization. A split cast supplemented rotational control. Postoperative xrays were done to confirm reduction. The patients returned for plaster removal after 6 weeks. They returned for Rush pin removal after 4 months for forearm fractures and after 8 months for tibia fractures.

Discussion of Forearm Fractures

Monteggia fracture and Galezani fractures require open fixation to reduce the fracture and to maintain stability. Some mid diaphyseal fractures resist closed reduction because of overlapping fragments. A frequent method is to use plate and screw fixation although intramedullary fixation has also been used^{1,2}. When open reduction is performed for forearm fractures, goals must include stabilization sufficient to produce fracture healing, protection against infection, and subsequent evaluation of muscle function for flexion/ extension/rotation³. There are several advantages for intramedullary Rush pin fixation -- less dissection of muscle is required yielding perhaps the better native muscle function, the pin is easily removed in case of infection, and the pins are generally easily removed after 4 months. The pins are reusable which has been a significant consideration in hospitals with limited resources. There were several patients who for various personal reasons declined referral to a tertiary center. We found that open reduction and fixation was an achievable alternative in our district hospital with few complications.

There were several lessons learned during this period. We found that fixation with Rush pin addressed the problem of overlapping fragments well but did not control rotation. We found that at times we were able to fix one bone with the Rush pin and then manually reduce the other⁴. Rotational control was resolved by using an above elbow split cast for the first four weeks.

Then the cast was removed and active motion of the elbow begun. Depending on clinical assessment of callus, a subsequent below elbow split cast or brace was used for an additional two weeks. Fracture healing and function was checked at six- eight weeks and then again on review after 4 months. Xray confirmation of good union was generally obtained and the Rush pin removed with local anesthesia and sedation. Comparison to experience with intramedullary fixation in children offered guidance in observing our series of adult patients ^{5,6}.

Table 1. Outcome and complications of forearm fracture (29)

Infection	2 minor 1 major infection requiring removal of pin
Non- union	All fractures went on to union
Function	Supination- pronation averaged 110 degrees
Neurologic	No neuropathy was identified

Discussion of Tibia Fractures

Many tibia fractures are treated by manipulation and plaster cast. However some fractures have significant displacement of fragments and are resistant to closed reduction ⁷. Others have been able to do closed intramedullary nailing ⁸. but in our circumstances we found that open reduction has been required. It has sometimes been sufficient to appose the bone fragments by open reduction and manipulation. When the fracture has not been stable, we have taken the lesson of intramedullary nail fixation from others ^{9,10} and found that Rush pin fixation is a good alternative. Others have found that plate fixation may be a preferred technique ¹¹ but this may assume more resources than we had available. When Rush pin fixation is used, we have learned three important lessons. The curve of the Rush pin must be against the rotational direction of the fracture to secure good reduction. Rotation must be controlled by split cast which is worn for about 6 weeks. One must guard against posterior bowing when applying the cast. Then depending on fracture healing the cast can be removed. We were able to remove the rush pin after about 8 months.

Outcome and complications of tibia fracture (21)

Infection	1 minor wound infection, resolved by opening wound
Open Fractures	3 open fractures were successfully treated by intramedullary pin and then open wound care until healing finished
Function	2 had slight posterior recurvatum but this did not interfere with good gait

Discussion of Humeral Fracture

We treated the majority of humeral fractures by closed splinting. However there are times when the fracture fragments are displaced a great deal and intramedullary pin has been recommended ^{12,13}. We applied this method to one patient with a displaced fracture through the surgical neck of humerus.

Conclusion

This retrospective audit has demonstrated the successful use of Rush pins to aid in fixation of displaced fractures of the forearm and the tibia. It is a method applicable to the district hospital setting where there are limited resources and where referral pathways to tertiary centers may be cumbersome. The methods can be of great use to the district hospital surgeon who is already versed with the basic principles of fracture care. There were good results with little complication.

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