#1121 - Clinical Study / Free Papers

Tibial Bone Defects: Analysis Of Time To Union And Direct Medical Costs Using Distraction Osteogenesis With An Ilizarov Frame Or The Masquelet Technique.

Trauma / Knee & Lower Leg Trauma / Surgical Treatment

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Background
Successful management of segmental bone defects remains one of the biggest clinical challenges. Contemporary treatments include bone transport (using circular fixators, monolateral exfx, or lengthening nails), defect reconstruction (with vascularized bone grafts; the Masquelet technique; the use of titanium cages and composite grafts), or even limb amputation under certain conditions.

Objectives
Aims of this study were a) to define the direct medical cost of the surgical treatment of tibial bone defects in a single tertiary referral centre, b) to compare the direct cost between Ilizarov bone transport (ILF) *vs.* the internal fixation staged Masquelet (MIF), & c) to compare the direct cost between cases of acute bone loss *vs.* cases with secondary bone loss generated during the treatment of infections/nonunions.

Study Design & Methods
Prospectively collected data were reviewed and analysed. Patients <18 years old or with follow up less than a year were excluded. Random selection of patients treated with MIF or ILF was performed. Data collected included demographics, comorbidities, severity of trauma, bone defect size, duration of surgery, exact numbers of sterile kits and types of implants, transfusions, laboratory & imaging investigations, inhospital medications, length of hospital stay, visits to the outpatient clinics, time to defect union, and time to final discharge.
A cost-effectiveness analysis was performed utilising the finance department of our hospital, the 2019/20 National Tariff, the British National Formulary, as well as the price list from industry partners in regard to all utilised implants. Descriptive statistical analysis was performed.

Results
Twenty patients (10 with acute & 10 with nonunion defects; half treated with ILF and half with MIF) were included in this analysis. The mean defect size was 5.59cm (2.65-9.52), the mean time to union was 12.91months (4.6-22.2), with an overall cost of £453,974.
No statistically significant difference was proven in regard to the average age, ISS, ASA score, defect size, duration of fup, the overall LOS till union, and the cost of inhospital stay. The overall direct medical cost of the MIF group was 74% of that of the ILF. There was statistically significant difference favoring the MIF group on the average time-to-union (10.03 vs 15.55 months, p=0.02), the number of surgical procedures (3 vs 4, p=0.049), the number of admissions (2 vs 3, p=0.026), the intraoperative cost (£8857 vs £14087, p=0.001), the cost of outpatient clinic fup (£2147 vs. £5240, p<0.001), the cost per cm of defect (£1935 vs. 3799, p=0.047), and the overall cost of treatment (£18131 vs £26126, p=0.011).

No statistically significant difference of cost was found between acute and nonunion defects managed with an ILF. When the MIF was used, the mean time to union (7.91 vs. 12.67months, $p<0.001$), as well as the cost of outpatient fup (£1368 vs. £3122, $p<0.001$) were significantly lower on acute vs nonunion defects.

Conclusions

The successful management of segmental tibial defects represents a challenging task, requires surgical expertise, time, and significant resources. There were clear differences in the direct medical costs between the 2 most common procedures for this indication. Even with an uncomplicated clinical course the high cost of the implants, the considerable time till defect union, and the need for fup and secondary procedures, highlights the importance of robust reimbursement strategies, since both techniques are indispensable.