

Results of open wound technique in the treatment of post-sequestrectomy dead space

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Summary

Background and method. Severe chronic osteomyelitis with variable outcomes is still common among children in developing nations. There has been no consensus on the optimal method of treatment. We therefore prospectively evaluated the rates of wound healing and recurrence following open wound treatment of post-sequestrectomy dead spaces in 30 patients with haematogenous chronic osteomyelitis of the tibial shaft at the King Orthopaedic Clinic, Ekpoma, Edo State, Nigeria, between January 2001 and December 2005. Thirty similar patients whose post-sequestrectomy dead spaces were treated by closed wound technique formed the control group. Both groups were subjected to standard methods of perioperative management. Saucerisation, sequestrectomy and curettage were the cornerstones of surgical therapy. The wounds were primarily either left open (study group) or closed (control group). The rates of wound healing and recurrence were used to assess the outcome of treatment. The chi-square test was used for statistical analysis.

Results. The median age was 13 years, with a range of 6 - 60 years. *Staphylococcus aureus* was the organism most commonly associated with chronic osteomyelitis. Rates of wound healing and recurrence in the study group were significantly better than in the control group ($p < 0.05$), even though it took a relatively longer period to achieve healing with the open method of treatment. The follow-up period ranged from 1 to 5 years, with a median of 2 years.

Conclusion. We observed that the results of the open method of treating post-sequestrectomy dead spaces were good, and we advocate its use in resource-poor settings.

Florida, chronic haematogenous osteomyelitis is still common among children in developing nations, with variable outcome.¹⁻⁶ There has been no consensus on the optimal method of treatment.¹⁻⁷ Surgical options range from simple saucerisation, sequestrectomy and curettage with primary or secondary wound closure,¹ to radical bone debridement with bone grafting and/or muscle flap cover.⁷

The major problem associated with the treatment of chronic osteomyelitis is persistent or recurrent bone infection which may be caused by persisting local ischaemia, foreign body reaction (gauze or sequestrum), inadequate debriding of the infected tissues, or patient immunocompromise. The management of post-sequestrectomy dead space plays a major role in the outcome of the treatment of chronic osteomyelitis.^{1,7,8} An effective surgical treatment of chronic osteomyelitis should remove all dead tissue, close the resulting cavity, revascularise the poorly perfused bone, and control the infection.^{1,7} These objectives are very difficult to achieve.

Various methods have been employed in the management of post-sequestrectomy dead space. The cavity has been left open, either to granulate directly, or packed with cancellous bone graft material with delayed closure (the Papineau technique).⁷ Alternatively, the cavity was closed by direct apposition of the skin, or by direct myoplasty, or closure over the bone grafts as a single-staged procedure, or over the antibiotic beads in a two-staged Belfast technique.^{1,7} The choice of method has been at the discretion of the attending surgeon, with variable results between the methods.

We therefore evaluated the results of a direct open wound technique in treating a post-sequestrectomy dead space, so as to make recommendations.

Patients and methods

We carried out a prospective evaluation of the rates of wound healing and recurrence following direct open wound treatment of post-sequestrectomy dead spaces in 30 patients treated for localised haematogenous chronic osteomyelitis of the tibial shaft at the King Orthopaedic Clinic, Ekpoma, Edo State, Nigeria between January 2001 and December 2005. Thirty similar patients whose post-sequestrectomy dead spaces were treated by direct closed wound technique formed the control group. Patients with traumatic, diffuse or recurrent chronic osteomyelitis and excessive scarring of the overlying skin were excluded from the study. Consecutive patients who met with the inclusion criteria were recruited for the study. The patients were divided into two groups. Group A was the

TABLE I. OUTCOME OF TREATMENT OF POST-SEQUESTRECTOMY DEAD SPACE

Treatment modality	N	Healed N (%)	Recurrence N (%)
Study group (A)	30	25 (83.30)	5 (16.70)
Control group (B)	30	12 (40.00)	18 (60.00)

study group whose post-sequestrectomy dead spaces were treated by direct open wound (granulation) technique, and group B was the control group whose post-sequestrectomy dead spaces were treated by direct skin closure. These are the two techniques commonly employed in the clinic at the discretion of the surgeon. Informed consent was obtained from all patients in the study.

The first patient was placed in group A by ballot, and subsequent patients were alternated between the groups. All patients in the groups received the same standard methods of perioperative management. Saucerisation, sequestrectomy and curettage were the cornerstones of surgical therapy. Patients were further assessed by physical examination of the operation sites, by serial evaluation of the erythrocyte sedimentation rate (ESR) and by radiography. The results of treatments were evaluated by the rates of wound healing and recurrence between the groups. The chi-square test was used for statistical analysis.

Results

Patient ages ranged from 6 to 60 years with a median age of 13 years. The male to female ratio was 2:1. The common pathogen was *Staphylococcus aureus* (70% of cases). The outcome of treatment was as shown in Table I.

The differences between the study and control groups in terms of the rates of wound healing (83.30% v. 40.00%) and recurrence (16.70% v. 60.00%) were statistically significant ($p < 0.05$). When the 5 patients with recurrence in group A received repeat bone debridement with open wound treatment technique, all the wounds healed. The time to healing was 6 - 8 months for group A patients, and 4 - 6 months for group B patients.

The rates of wound healing and recurrence in the study group were better than in the control group, although it took longer for wounds in the study group to heal. The follow-up period ranged between 1 and 5 years with a median period of 2 years.

Discussion

Severe chronic haematogenous osteomyelitis is a common childhood problem in developing countries despite the availability of potent antibiotics and surgical treatment.¹⁻⁷ In this study, the median age of the patients with chronic osteomyelitis was 13 years. These children commonly presented with florid chronic osteomyelitis which often required surgical treatment.^{1,8} The study further confirms that *S. aureus* is the common pathogen in osteomyelitis.^{1-5,9}

Recurrent chronic osteomyelitis was a major problem associated with the closed wound technique of treating post-sequestrectomy dead space in this study, and was responsible for repeated surgical treatment and prolonged morbidity.¹ We observed that open wound treatment for post-sequestrectomy dead space was superior to the closed wound method, and we recommend it in resource-poor developing countries.

While the search for the best method of treating post-sequestrectomy dead space is ongoing, we propose a further prospective study to compare the open wound method with other treatment modalities to further elucidate the best of the available options in our setting.

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