



Success rates and complications of autologous onlay bone grafts and sinus lifts in patients with congenital hypodontia and after trauma

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Abstract

Autogenous bone remains the gold standard for augmentation of the alveolar ridge in congenital hypodontia and appreciable post-traumatic deformity. This generally reflects the volume of material required for such defects and the osteogenic potential of the grafts. Morbidity at the donor site and success rates may lead to autogenous grafts being superseded by xenografts or alloplastic materials in the future, but we know of little evidence to confirm this. All patients having augmentation of the alveolar ridge or sinus lift to enable subsequent placement of implants between 01 January 2009 and 31 December 2016 were identified from a prospectively-gathered database held at the Queen Elizabeth Hospital, Birmingham. Morbidity was recorded, with overall success defined as a graft that enabled subsequent placement of an implant. During this period the following grafts: calvarial (n = 4), iliac crest (n = 4), and ramus (n = 149) were recorded, as well as 53 sinus lifts. Sinus lift augmentation with BioOss® had the highest success rate (51/53). Calvarial and iliac crest grafts had higher failure rates (2/4 and 3/4, respectively) than those from the mandibular ramus (6/149, 4%). Fifteen of 149 (10%) ramus grafts resulted in transient anaesthesia of the inferior alveolar nerve but no patients developed any permanent morbidity at the donor or recipient sites. Ramus grafts are a predictable method of bone augmentation with only transient morbidity at the donor site. Higher failure rates for extraoral grafts probably reflect their use in more challenging cases when more bone is required. Bilateral ramus grafts are an alternative to extraoral grafts and may be supplemented by bovine-derived particulate grafts with no appreciable increase in complications.

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Introduction

Hypodontia is the term most commonly applied to a condition in which teeth congenitally fail to develop.¹ Patients generally present in their early teenage years after secondary dentition has failed to erupt.² Such patients are best man-

aged by a multidisciplinary team in hospital, which enables input from restorative dentists, orthodontists, and surgeons.³ The rehabilitation of edentulous ridges in cases of congenital hypodontia follow algorithms similar to those of patients with teeth missing from other causes.⁴ Rehabilitation may be with fixed or removable prostheses. Retention is improved by the use of implants, and atrophic alveolar ridges may require augmentation to enable their placement.^{5,6}

Augmentation may be either vertical or horizontal, and may comprise block or particulate grafts that include membranes to guide bony regeneration,⁷ and the different

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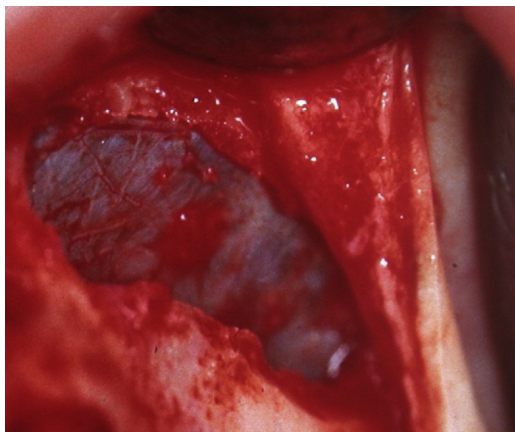


Fig. 1. Clinical photograph of a lateral window approach to a maxillary sinus.

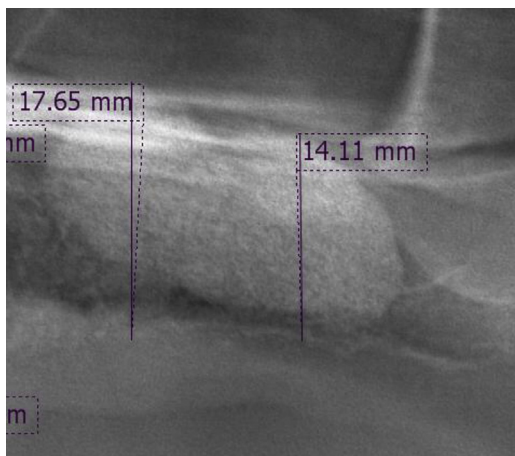


Fig. 2. Radiograph illustrating the lateral window approach to the maxillary sinus using particulate graft to show the potential height of bone that can be achieved.

augmentation techniques are normally based on the classification of resorption of the alveolar crest by Cawood and Howell.⁸ Materials described for augmentation include autogenous bone, cadaveric grafts, xenografts, and alloplastics.⁹ Sinus lifting may be used in conjunction with particulate grafts, and can be done using both crestal and lateral window techniques (Figs. 1 and 2).¹⁰

If the cause of the edentulous ridge is not congenital, the standard technique for augmentation is a particulate graft, often together with a membrane or a mesh. Xenograft (such as Bio-Oss[®], Geistlich Biomaterials) and cadaveric (such as DBX[®], DePuy Synthes) particulates are the most successful, but are in some cases limited by cultural sensitivities. Alloplastic materials are generally based on calcium phosphate cements and are similar in composition to bone with bioactive (able to directly bond to bone to form a uniquely strong interface) and osteoconductive (able to serve as a template or guide for the newly-forming bone) properties.¹¹ Calcium phosphate biomaterials currently have lower success rates than other materials, particularly in large defects.^{11–13}

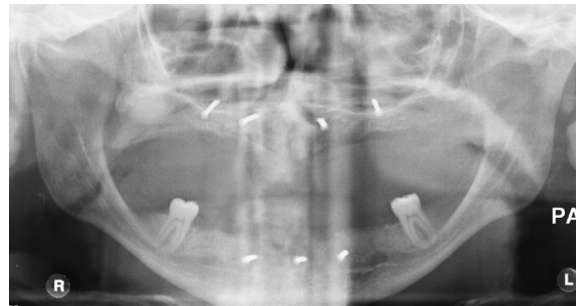


Fig. 3. Lag screws in place after bone grafts to the maxilla and mandible from the iliac crest.

Autogenous bone remains the gold standard for augmentation of the alveolar ridge in congenital hypodontia and appreciable post-traumatic deformity.^{5,7} This generally reflects the volume of material required for such defects and the osteogenic potential of such grafts. However, extraorally-derived autogenous bone grafts are rarely used outside hospital, for several reasons. Extraoral harvest (such as from the calvarium or iliac crest) is clearly unrealistic in primary care and has the potential for appreciable morbidity (Fig. 3).^{5,6} Intraoral grafts (such as from the ramus) can be reliably harvested under local anaesthesia but there are concerns about the risk of damage to the inferior alveolar nerve and potential infection of the recipient site.¹⁴ Morbidity at the donor site and improving success rates may lead to autogenous grafts being superseded by xenografts or alloplastic materials in the future, but we know of little or no evidence to confirm this.

The aim of this study was to report the success rates and complications of autogenous bone grafts and sinus lifts to find out how useful they are in the rehabilitation of patients with congenital hypodontia and after trauma.

Method

All patients who had augmentation of the alveolar ridge or sinus to enable subsequent placement of implants between 01 January 2009 and 31 December 2016 were identified from a prospectively-gathered database held at the Queen Elizabeth Hospital, Birmingham. Only patients who had autogenous bone grafts and in whom the indication for treatment was congenital hypodontia or dentoalveolar trauma were included in the analysis. Variables comprised the sites from which the donor grafts were harvested, and which were augmented. Perioperative and postoperative complications were recorded, with overall success defined as a graft that enabled subsequent placement of an implant. We compared the overall success rate and incidence of postoperative complications for smokers and non-smokers using the chi square test, and probabilities of 0.05 or less were accepted as significant.

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