Banks and should guarantee the sterility of its tissues. However, it is still necessary to obtain proper informed consent regarding the small risk of infectious disease transmission. The surgeon should maintain a personal record of all allogeneic tissues implanted, in addition to the hospital records of deposit and lot numbers, the processing tissue bank, and recipient identification. Toward clearer definition of the scope of tissue banking, a national tissue registry similar to that formed for organ transplants should be established.

Summary.—The risk of infectious disease transmission from allogeneic bone, dura, and cartilage specimens is very rare in recipients of tissues obtained from bona fide U.S. tissue banks.

► In another article in this section, the recommendation was made that surgeons become familiar with tissue bank's protocol for the screening and prevention of the transmission of disease. This article presents a comprehensive summary of the diseases, tissues, and procedures involved. Virtually everything a surgeon needs to know is discussed. Every clinician who is using allogeneic tissues for transplantation should read this article.—S.M. Roser, D.M.D., M.D.

Application of Purified Bone Morphogenetic Protein (BMP) in Cranio-Maxillo-Facial Surgery: BMP in Compromised Surgical Reconstructions Using Titanium Implants

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J Craniomaxillofac Surg 22:2–11, 1994 105-95-14-7

Early Bone Products.—Chemically unaltered allogeneic bone is not suitable for use in bridging bony defects for immunologic reasons, but experimentally at least, demineralized and defatted allogeneic bone has an osteoinductive effect in both orthotopic and ectopic sites. Past studies of demineralized bone preparations have given mixed results (Table 1).

Current Methods.—Most studies of purified bone morphogenetic protein (BMP) used in conjunction with either autologous bone or antigen-extracted, autolyzed allogeneic (AAA) bone, have reliably achieved solid bony union in a variety of applications (Table 2). The preparation of BMP has been from fresh, young bovine bone because of the difficulty of procuring human bone. The major BMP components are identical in human and bovine preparations.

Study Design.—Bovine BMP was used in 271 operative procedures performed on the face and cranium in 145 patients. The preparations first were tested for bone-inducing activity in a mouse assay. The clinical procedures chiefly used 1 mg of purified BMP per cubic centimeter of paste and granular human bone matrix, made from demineralized femo-

TABLE 1.—Reports on Application of Modified Bone Preparations in Patients (Demineralized or AAA Bone)

Authors and year of publ.	Number of patients	Diagnosis	Implant type used	Time of observation	Results and comments
Sharrard and *Collins* (1961)	3	Scoliosis	Demineralized autologous bone matrix	long term	good
Mulliken, *Glowacki* et al. (1981)	44	Congenital cranio-maxillo-facial malformations (37), acquired lesions (7)	Demineralized bone matrix (human)	up to 1 year	good
Urist and *Dawson* (1981)	40	Spondylolisthesis or degenerative joint and disk disease	AAA bone (human)	5-9 years	good. Results equal to autologous controls
Sonis, *Kaban* et al. (1983)	21	Periodontal defects	Demineralized bone matrix (human)	5-18 months	Pocket depth decreased in more than 50% of patients
Ousterhout (1985)	25	Cranio-maxillo-facial defects, congenital and acquired	Demineralized bone (human) from commercial source	6-18 months	Significant resorption in operations for contour augmentation
Toriumi et al. (1990)	53	Reconstructions of the nose (51 cases)	Demineralized bone (human) from commercial source	1-3 years	50-82% resorption
Total	186				

Abbreviation: AAA, autolyzed allogeneic.
(Courtesy of Sailer HF, Kolb E: *J Craniomaxillofac Surg* 22:2–11, 1994.)

TABLE 2.—Purified BMP Plus Autologous Bone or AAA Bone

Authors and years of publication	Number of patients	Diagnosis	BMP implant type	Additional materials implanted	Healing time	Results and comments
Johnson et al. (1988)	6	Traumatic tibial defects, 3-17 cm long	BMP within PLA/PGA onlay strip	Autologous cancellous bone; metal fixation (int. or ext.)	5½	Good
Johnson et al. (1988a)	12	Femoral shaft nonunions	BMP within PLA/PGA onlay strip or within gelatin capsule onlay	Autolog. (4) or AAA bone (4). No bone (4). Metal appliances for fixation (12)	4.7	Solid union
Johnson et al. (1990)	4	Nonunions of distal tibial end	BMP within PLA/PGA onlay strip (2), BMP in gelatin caps. in fracture. gap (1) or as onlay (1)	Autol. bone (1). Autol. + AAA bone (1) imbibed with BMP. No bone (2)	4.4	Solid union
Johnson et al. (1992)	25	Nonunions of tibia (7), femur (12) or humerus (6) with or without defects (10; 2-9 cm long)	BMP within and on the surface of AAA bone	AAA bone alloimplant imbibed with BMP alone (18), plus autol. bone chips (7). Metal fixation (int. or ext.) in all cases	6	Solid union in 24 cases. No union in 1 case due to recurrent infection (not received autologous bone)
Total	47					

Abbreviation: BMP, bone morphogenetic protein.
(Courtesy of Sailer HF, Kolb E: *J Craniomaxillofac Surg* 22:2-11, 1994.)

ral bone. Occasionally BMP was added to the buffer used to rehydrate lyophilized cartilage or lyophilized bone.

Clinical Results.—Purified bone morphogenetic protein has been used in maxillofacial reconstructions, including pseudarthroses; in cranial reconstruction for contour augmentation; and in implant procedures where healing ability is impaired. Examples of the outcome in implant cases are shown in Figures 14-1 and 14-2. The patients had compromised bone and/or soft tissue defects. Iliac bone grafts and titanium screw implants were used in these cases. The most endangered implants exhibited osseointegration 6 to 8½ months after their placement.

Conclusion.—Preparations of purified BMP hold considerable potential in a number of clinical settings, including implant patients whose bony and/or soft tissue conditions are unfavorable. The material is well tolerated. Freeze-dried allogeneic human bone and cartilage, treated

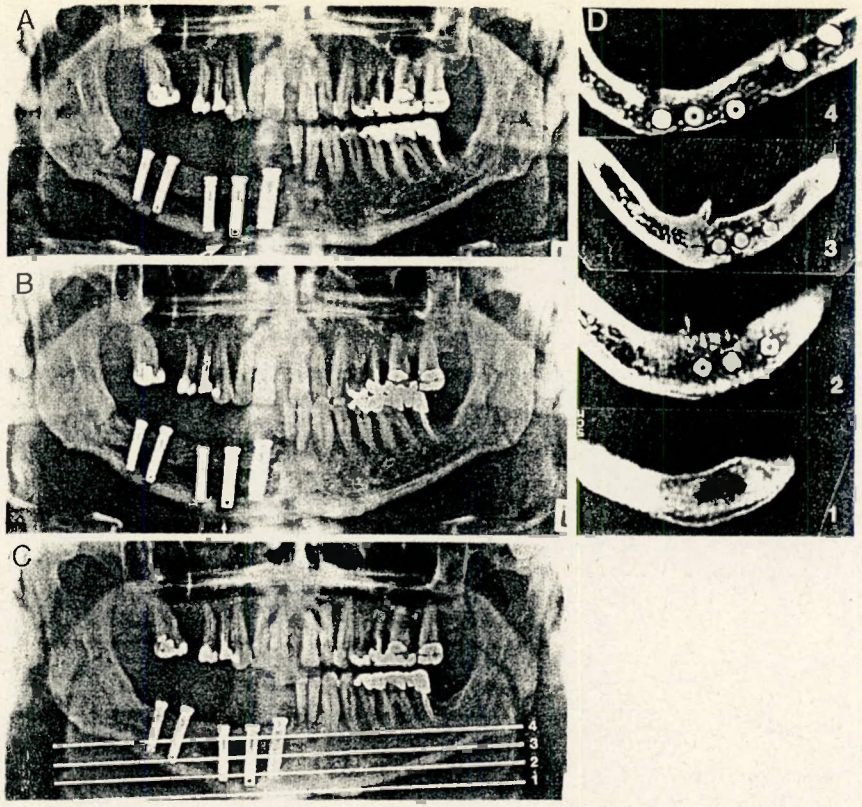


Fig 14-1.—Horizontal sandwich type reconstruction of right mandible using iliac bone interposition 5 years after tumor resection. Development of massive infection 2 months after sandwich procedure. **A,** orthopantomogram showing osteolysis at the tips of the 2 mesial implants (*arrows*). **B,** 6 weeks later osteolysis is reduced, and a periosteal reaction has developed around 3 mesial implants (*arrows*). **C,** 8½ months after revision, the cover and the base of the sandwich are joined by new bone, and osteolytic areas described above have disappeared. The width of the mesial half of the mandible has increased considerably. *Lines 1–4* show planes of horizontal CTs taken 10½ months after revision. **D,** computed tomography images, *planes 1–4*: 5 implants, covered by bone at all levels. (Courtesy of Sailer HF, Kolb E: *J Craniomaxillofac Surg* 22:2-11, 1994.)

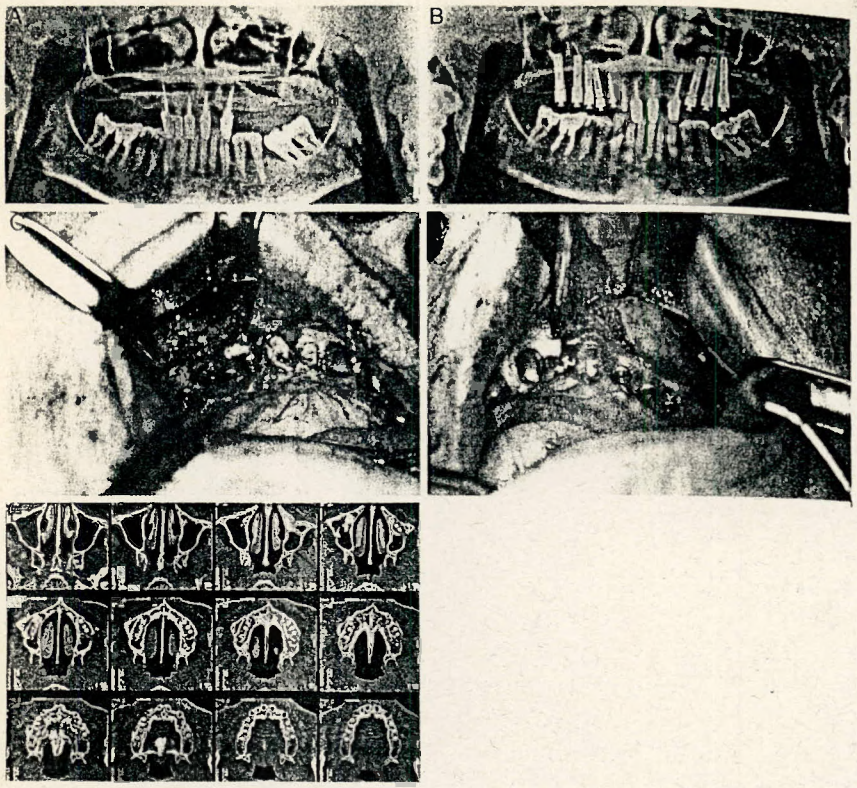


Fig 14–2.—A and B, orthopantomograms before and 7 months after reconstruction (sinus inlay method with iliac grafts). Note increased bone mass within the maxillary sinus in B. C and D, operation site, right and left, after 7 implants have been inserted through the thin maxillary ridge into iliac bone transplants. E, computed tomography in successive horizontal planes, moving craniocaudally. All implants at all levels are covered by bone. (Courtesy of Sailer HF, Kolb E: *J Craniomaxillofac Surg* 22:2–11, 1994.)

with purified, concentrated bovine BMP, may provide an equal substitute for fresh autologous bone grafts.

► Recently, proteins have been isolated from bone that induce bone growth and differentiation (BMP). It appears that human and bovine BMPs share common structures, and BMP has been used both experimentally and clinically with good results. In this report, the authors report on the use of a BMP paste preparation around implants placed in compromised host bone. The authors state that based on their clinical observations, BMP appeared to induce the transformation of periosteal and other mesenchymal cells into osteoblasts. The prospect of inducing bone formation to reconstruct, recontour, and heal the skeletal system is incredibly exciting. The widespread use of BMP awaits further investigation into long-term results and the synthesis of human BMP using recombinant DNA.—S.M. Roser, D.M.D., M.D.

15 Temporomandibular Disorders

Introduction

Over time a great number of techniques have been offered for the treatment of temporomandibular disorders (TMDs). However, few have been universally accepted. A reason for this may be the lack of understanding of the multiple personality and behavioral aspects of patients with TMDs that can obscure the true muscle and joint pathology. Articles in this section describe both the personality characteristics of patients with TMDs, as determined by the Minnesota Multiphasic Personality Index (MMPI), and the issues involved in the prevalence of TMDs in women. The goals of treatment for TMDs are to reduce or eliminate painful symptoms and to restore joint function. There are many nonsurgical management schemes for TMDs. All are reported to meet with success.

The question of the role of the occlusion in the etiology of TMD and the effectiveness of splint therapy are 2 topics discussed in this section. The role of surgery in the treatment of TMDs is small but, nonetheless, important. Interest in various surgical options has vacillated as early enthusiasm has been replaced by skepticism as the failures have begun to accumulate. Arthroscopy of the TMJ has radically changed surgical thinking, particularly about the significance of disk displacement. Arthroscopic observation has ushered in a great deal of thinking about joint physiology and the pathophysiology associated with various conditions found in TMDs. The goal of restoration of normal joint physiology rather than structure by surgery is the subject of an excellent review article in this section. The indications for open joint surgery are being reevaluated. A good prospective study presented in this section reveals some interesting findings about an old procedure, the diskectomy. Finally, a 30-year retrospective study of patients with osteoarthritis and internal derangement concludes that most patients' bothersome symptoms before quiescent 2 to 4 years after initial nonsurgical treatment—an interesting finding about which to speculate.

Steven M. Roser, M.D., D.M.D., F.A.C.S.

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shown. Detailed descriptions with drawings of various rhinoplasty techniques using cartilage grafts with or without bone grafts will be presented.

EXPERIMENTAL CHEMOTHERAPY OF HUMAN SQUAMOUS CELL CARCINOMA HETEROTRANSPLANTED TO NUDE MICE: RESPONSE OF DOCETAXEL IN DIFFERENT TIME SCHEDULES

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Aims: To study transplantation of human tumour cells into immunodeficient mice. This has provided an in-vivo model for the study of biological behaviour and tumour progression.

Method: Tumour cells of a recurrent tongue carcinoma (ZK001) were cultured and subsequently injected subcutaneously into several NMRI-mice. Following tumour growth the tumour was then transplanted into other nude mice. Histologically the tumour showed the same characteristics as the host. A total of 74 tumours distributed into 3 groups were treated with i.p. injection of Docetaxel (30mg/kg). Different time schedules were tested: Group I: Treatment days 1 and 7, group II: treatment days 1, 4 and 7 and group III: treatment days 1,4,7 and 11. 34 untreated tumours served as controls. Tumour volume and body weight of tumour bearing animals was measured every four days. 14 days after the last drug injection the animals were sacrificed. Blood samples from the jugular vein were taken and serum levels of tumour markers SCC, TPA and TPS were assessed. Tumours were dissected from the animals and placed in 4 % formaldehyde for histological examination.

Results: Treatment was well tolerated by the animals. Treatment-related deaths occurred in four animals. Compared with untreated mice, the tumour growth curves of Docetaxel-treated mice showed a clear growth inhibition which was independent of the time schedule of drug administration. Only SCC values correlated well with tumour volume in mice.

Conclusion: Docetaxel was active in this murine model of human squamous cell carcinoma. No increased activity in tumour growth inhibition could be demonstrated in different time schedules. In the clinical setting, Docetaxel is currently under investigation in recurrent head and neck cancer at our institution, in particular with focus on dose intensification.

THE INFLUENCE OF APPLYING REPLACEMENT THERAPY ON THE SUCCESS OF IMMEDIATE POST-EXTRACTION DENTAL IMPLANTS

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AIMS: Placing any type of implant into an immediately post-extraction socket was always said to be hazardous, because clinicians are faced with two major problems: initial stability of the implant(s) used, and soft tissue ingrowth during the healing period. Therefore, most clinicians tend to wait at least twelve weeks before inserting the implants. This study combines two particular materials, used when performing Replacement Therapy™ to define if one can produce predictable results and success.

METHODS: Teeth were extracted in 102 patients, between 19 and 71 years old, and a total of 416 ITI single stage titanium screw implants were placed immediately 2-5mm apically into the extraction sockets. Bioplant HTR 40 Synthetic Bone, the smaller size of these microporous granules, was used for packing apically in the socket. Primary closure was done with Vicryl Rapid 2/0 or 3/0 for suturing the flap(s), and with Vicryl Normal 4/0 around the neck of the implants. Prosthetic rehabilitation was obtained by placement of ball retained overdentures and cemented crowns and bridges.

RESULTS: The 7 year follow-up revealed no allergic reaction, inflammation swelling or pain. Very important, was that no soft tissue ingrowth was ever seen. Bioplant HTR itself seems to act as a membrane. The material initially forms dense or very dense fibrous tissue under the gum flap, preventing epithelial and connective tissue ingrowth around the implant. No implant was lost after 7 years. No measurable loss of bone height and width was seen during this follow-up period of 7 years. The material always produced immediate surplus stabilisation and helps stop bleeding. Because of its naturally slight negative charge of -10mV, the material sticks to the titanium, stays where it is placed and repels micro-organisms.

CONCLUSIONS: Bioplant HTR Synthetic Bone is an excellent and simple-to-use graft material, highly suitable to combine with immediate titanium single stage screw implants, such as the ITI Straumann implants. Applying Replacement Therapy™ following the protocol tremendously improves the survival rate of immediate post-extraction implants. This will become the future in Implant Dentistry, because it provides every clinician the certainty of success in a very easy way, and it saves the patient surgery time and money.

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CONDYLAR RESORPTION BEFORE AND AFTER ORTHOGNATHIC SURGERY

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Aims: To analyse the incidence of condylar resorption following orthognathic surgery and determine common factors in the cases involved. To analyse skeletal stability in patients with preoperative flattening and other changes of the condylar form due to orthodontic therapy with headgear and other functional appliances at an earlier age.

Method: Cephalograms and orthopantomograms taken preoperatively, immediately postoperatively and two years postoperatively in a group of 452 patients who underwent orthognathic surgery were analysed retrospectively for signs of condylar resorption. This was detected in eleven patients out of 452 (2.4%) without preoperative flattening of the condyle (Group 1). In ten other patients analysis of

orthopantomograms and cephalograms taken before starting orthodontic therapy at an earlier age, and the radiographs taken before starting preoperative orthodontic coordination, showed flattening and loss of at least the vertical dimension of the condyle (Group 2). These data were compared with radiographs taken preoperatively, immediately postoperatively and 2 years later with emphasis on the posterior facial height and the mandibular plane angle.
Results: The patients in group 1 showed the characteristics reported in the literature i.e. female patients, high mandibular plane angle (51°), preoperative TMJ disorders.
Group 2 also consisted exclusively of female patients with high mandibular angle (53°) and preoperatively existing TMJ disorders (8/10) Condylar resorption and ensuing malocclusion were seen in two cases, whereas occlusion was stable in the remaining eight cases. However, cephalometric parameters showed beginning condylar resorption in three of these.
Conclusions: 1. Although condylar resorption occurs in less than 3% of all orthognathic cases, the patients involved should be informed concerning this risk. 2. Analysis of radiographs before and after orthodontic therapy with functional appliances at an earlier age is mandatory before starting combined treatment in high mandibular angle cases. If condylar resorption is already present at that stage, the patient should be informed that the prognosis concerning skeletal stability is compromised. Yet combined treatment is the only method available to obtain neuromuscular balance and a functional occlusion thus correcting overloading of the TMJ.

PROGNOSIS AFTER MARSUPIALIZATION OF A DENTIGEROUS CYST IN THE LOWER PREMOLAR REGION:

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The purpose of this study was to investigate the prognosis of the lower premolars after marsupialization of a dentigerous cyst. Fifty-seven pre-adolescents (Mean age: 10.9 years) with a dentigerous cyst in the lower premolar region were used as subjects. Almost all subjects' chief complaint was "swelling of oral mucosa of the lower premolar region". They had already been treated by marsupialization in our hospital. Panoramic radiographs and charts from the initial stage to post-treatment were examined closely in order to measure the exact size of the cyst, position of the impacted premolar and maturity of the dental root and to examine the treatment results. Natural eruption occurred in forty-four cases, mechanically assisted eruption was made possible in seven cases and extraction was performed in six cases. There were no significant correlationships between successful eruption and the size of cyst and the position of the impacted premolar. Premolars with an immature root had a tendency to erupt more easily and the size (more than 6mm) of space in which to erupt was an important factor in obtaining a successful outcome. The results suggest that the state of the dental root and space for eruption may be important factors in achieving a good outcome after marsupialization of a dentigerous cyst in the lower premolar region.

TRAUMATISM AND FRACTURE TREATMENT OF MIDDLE PART OF FACE

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Aim: The improvement of the fracture treatment of middle part of the face and the decrease in the post-traumatic complications.
Methods: We had studied 2413 patients who had been treated from 1992-1997. The fractures of the middle part of the face constituted 23.11%. When diagnosing the fractures, the following methods were used: the x-ray studies in different views, the computerised tomography, the ortopantomography, the endoscopy and infrared thermography. In the fracture treatment, orthodontic appliances, osteosynthesis with wires, and miniplates were used.
Results: According to the type, the fractures were classified as follows: mandiblular fractures - 76.89%; fractures of the naso-ethmoidal complex - 10.0%; fractures of the zygomatic bone - 9.71%; fractures of the zygomatic-orbito-maxillary complex - 3.4%. Fracture immobilization with orthodontic appliances impedes the normal oral cavity hygiene that sometimes results in development of superinfection. Osteosynthesis with the wire was an additional injury to the fractured bone; therefore, we consider that miniplates are best for the immobilisation of fractures and because they are less traumatic.
Conclusions: Computerised tomography is a more informative method, but at the same time it is rather expensive. Immobilisation with miniplates permits anatomical realignment and, thus, the eventual function normal. Endoscopy and infrared thermography can be used for the prophylaxis of complications.

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SURGICAL IMPLANT REHABILITATION OF PATIENTS AT ADOLESCENT GROWTH STAGES AFFECTED BY FIBROUS DISPLASIA OF THE UPPER JAW

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Maxillo Facial Unit University of Rome "La Sapienza" – Prof. Giorgio Iannetti

The Fibrous Displasia is a pathological alteration of bone structures consisting of a substitution of physiologic bone with fibrous tissue. Clinically it's possible to distinguish two forms: monostotic and polystotic forms. In the maxillo facial district the most frequent localization of the monostotic form is the upper jaw. The F.D. is a benign growth process with a tendency of local recurrence, for that reason, in our department, the selective therapy is the bone resection of the mass within healthy margins. The goals of the surgical reconstructive protocol are: surgery within healthy margins, re-establishment of extra and intra oral morphology with tissue reconstruction for functional and aesthetic rehabilitation. When the pathological event involves patients at adolescent growth stages, many