Paparella: Volume IV: Plastic and Reconstructive Surgery and Interrelated Disciplines

Section 1: Plastic and Reconstructive Surgery

Chapter 14: Maxillofacial Prosthetics

Gordon P. Huntress

Maxillofacial prosthodontics is the "art and science of anatomic, functional, or cosmetic reconstruction by means of nonliving substitutes of those regions in the maxilla, mandible and face that are missing or defective because of surgical intervention, trauma, pathology or developmental or congenital malformation". Discussions of maxillofacial prosthodontics tend to emphasize the concrete manifestation of prosthodontic care, the prosthetic device. The device is only one aspect of prosthodontic treatment. Prosthodontic care involves evaluation; diagnosis; treatment planning; patient education; prosthesis fabrication, maintenance, and modification; management of complications; and long-term follow-up care.

Evidence has been found indicating that the ancient Egyptians and Chinese made artifical facial parts. In recent centuries, gold, silver, and porcelain were used in prosthetic rehabilitation. In recent decades, chrome-cobalt alloys, methylmethacrylate resin, and silicone elastomer have permitted improvements in modern prosthodontic technique. Osseointegrated implants offer a new phase of refinement in rehabilitation potentials by providing secure retention for oral and facial prostheses.

Patients who require treatmetn of this sort may suffer the effects of traumatic injury, congenital or developmental defects, or intervention to eradicate head and neck neoplasia. The maxillofacial prosthodontist may produce the most ideal treatment when functioning as part of a treatment team, which may include the surgeon, radiation oncologist, psychologist, nuerse, social worker, and speech pathologist. Dental professionals in this team may include the dental hygienist, general dentist, pedodontist, orthodontist, oral surgeon, and prosthodontist. Input from all the appropriate specialties at the appropriate stages of patient management will optimize patient care and affect the success of treatment.

Congenital Anomalies

Cleft lip and palate are the most common anomalies dealt with in this area. The prosthodontist may secure intraoral and facial impressions to make models to record defects, surgical results, and the effects of growth. Preoperative dental casts permit the dentist to make a splint to stabilize the premaxilla while a bone graft is healing. An infant may be fitted with an obturator to close over a large palatal defect to improve feeding. A similar appliance may be constructed for infants and be used to apply orthopedic forces to the alveolar segments. By repositioning these segments before surgery, more ideal palatal form may be achieved. In most cases the hard and soft palate are corrected by the surgeon and integrated with treatment of the developing dentition by the orthodontist and pedodontist. In cases of severe malocclusion or missing teeth the prosthodontist may make an appliance to restore aesthetics and function by replacing the missing dentition. In patients in whom dental rches and teeth are severely malpositioned, the teeth may be shortened and covered with a gold casting to

prevent caries. The denture is designed to rest on the shortened teeth, and prosthetic teeth are positioned as needed to develop more ideal placement. A tooth-supported denture is extremely stable. Occlusal forces transmitted through the roots maintain alveolar bone. When surgical closure of the palate is delayed or contraindicated, an obturator may be made, to provide closure of the defect and allow the patient to develop normal speech and swallowing patterns. The obturator may be supported by teeth, as is a removable partial denture, or it may rest on edentulous ridges as a removable complete denture. Maintenance of any teeth to support the obturator will enhance its function and improve chances of successful function. Obturation of the hard palate defect is achieved by extension of the denture base into the static palatal defect. Development of the obturator for soft palate deficiency requires molding to conform to dynamic tissue surfaces. This molding is converted into a speech aid appliance, which allows the patient to form velopharyngeal closure by exerting muscular activity of the pharyngeal wall. Relaxation permits normal respiration around the obturator.

Alternative treatment may indicate the use of a palatal lift prosthesis to apply posterior and superior placement of a short or inactive soft palate, thus permitting pharyngeal activity to achieve closure against the soft palate.

Trauma

When dealing with facial fractures, the maxillofacial prosthodontist may contribute by reestablishing optimal jaw relationships and mode of stabilization, especially when there is inadequate dentition to permit intermaxillary fixation by purely dental means. The prosthodontist can secure impressions of edentulous or partially dentulous arches, relate models of the arches to the ideal position, and fabricate splinting devices to stabilize the jaw position. Splints may cover the entire maxillary or mandibular ridge, or may contact only the tooth surfaces and stabilize the dental arch.

Facial prostheses are indicated in cases of trauma or facial burns when surgery is neither feasible nor convenient; they may be used as a definitive or an interim form of treatment until surgery is accomplished in a later phase. Facial compression stents may be made to mold and reduce scar formation.

Burns of the oral commissure from electric extension cords are not uncommon. Early intervention with a splinting device to support the commissure will prevent the microstomia that follows scar contracture if no splinting is provided. Face mask and elastic head cap, acrylic extensions on braces cemented to the teeth, or removable, dentally supported splints are utilized, depending on the age and degree of compliance of the patient.

Head injury may produce neurologic effects that may be treated with prosthodontic techniques. A patient in coma may exhibit trismus or bruxism with compromised airway and oral soft tissue trauma (ie, tongue biting). Splint fabrication can provide oral airway patency and protect the tongue from trauma. Neurologic damage may affect speech production with lack of neuromuscular control of lips, tongue, mandibular movement, and velopharyngeal competence. A palatal lift prosthesis can be placed to improve velopharyngeal competence, oronasal resonance, and intelligibility.

Reconstructive Surgery

Pre- and postoperative records of the surgical defect and final result can be of great value. The securing of such records is a routine procedure for the prosthodontis. A durable three-dimensional record for accurate comparison of techniques and results may be made by pouring a plaster cast of an oral or facial impression.

Skin grafts are very useful in developing improved function in various intraoral surgical procedures (eg, releasing a tongue immobilized by scar tissue, lining excised buccal, labial, or lingual sulcus). The success of a surgically placed skin graft depends on its precise adaptation to its tissue bed. One means of ensuring this adaptation is to cover the graft with a stent fabricated from methylacrylate and lined with tissue conditioner by the prosthodontist.

Facial implants may be of many types of materials, such as autogenous bone, silicone, metal, and acrylic. They may augment various areas, including the mandible, maxilla, zygomatic arch, and cranium. If the surgeon wishes to use bone, the prosthodontist may provide a plastic mold of the desired shape and size to guide sizing and shaping of the graft. The prosthodontist is able to develop the size, contour, positioning, and construction of an implant. Choice of materials and technical procedures is determined jointly by the prosthodontist and the surgeon. An impression in irreversible hydrocolloid is taken of the defect, including adjoining facial regions as required. A model is poured in dental plaster and the shape of the implant is developed in moldable material (in wax or clay). The pattern may be tried on the defect area to check contour. The implant is then formed to match this ideal contour. Models of the bony defect can be made by milling machines, which are controlled by computer on the basis of serial CT scans of the defect. Heat-processed methylmethacrylate (acrylic) and metal (titanium, stainless steel, and so forth) are used for cranial, frontal, and zygomatic arch implants. Silicone (heat or room temperature vulcanizing) and autogenous bone grafts are also useful.

Surgical stents may be used to prevent scar contracture with healing tissue. The surgically reconstructed external auditory canal or the nasal valve may have a tendency to reduce lumen size as healing progresses. Custom stents of hard acrylic or flexible silicone may be used to maintain patency.

Head and Neck Cancer Management

Evaluation

Early prosthodontic referral helps to reduce oral and dental complications. The prosthodontist reviews the medical history, history of the present illness, and dental history. The status of oral hygiene, dental and oral awareness, caries, periodontal disease, and associated dental and oral pathology is determined. Clinical and radiographic examination determine what surgical and restorative treatment is needed before ablative surgery or radiotherapy is employed. Recommendations are made according to the status that can be expected after treatment has been completed, how surgery will affect oral and dental function, and projected prosthodontic needs.

The prosthodontist can contribute in treatment planning to coordinate prosthodontic care, oral surgical procedures, ablative and reconstructive surgery, and radiotherapy. This should be accomplished in an efficient sequence with as few procedures as possible, adequate time being allowed for healing to occur before the next phase of treatment, and with minimal disruption of the patient's ability to swallow, speak clearly, chew, and have a normal aesthetic appearance. Coordinating biopsy and endoscopic examinations with oral surgery procedures improves efficiency. Preoperative dental casts permit fabrication of surgical prostheses, or prostheses to be readily modified for use shortly after surgery.

Patient education is an important pre-treatment procedure. The patient must be impressed with the need for scrupulous oral hygiene, meticulous dental restorative care, persistent maintenance of that care, daily use of fluoride to prevent caries, and physical therapy measures to prevent trismus. Discussion of the contemplated surgery and the phases of prosthodontic rehabilitation, realistic reassurance regarding functional restoration, and a practical assessment of aesthetic and functional limitations are very important. This opportunity to communicate with the patient before treatment allows the prosthodontist to form a bond with the patient, one in which the patient is assured that there will be someone whose objectives will be to reestablish normal function and aesthetics. Along with this, the patient is told of the effects of the planned surgical procedures, how these effects will be countered, over what time span, and with what modifications to the prostheses. With enough information, presented in a positive manner, the patient can think through the procedure ahead of time, become acclimated to his or her future prospects, and thus undergo the actual procedures with more knowledge and confidence.

Radiotherapy

The use of radiotherapy in the treatment of head and neck cancer affects the prosthodontic management of the head and neck cancer patient. Radiotherapy has many effects, both direct and indirect, on the oral cavity. In its acute stages, radiotherapy causes mucositis and ulceration of the mucous membranes. In its secondary effects, there is a change in the saliva: there is less flow, it is more acidic and more viscous, and it has a reduced buffer capacity. The oral microflora is higher in cariogenic bacteria and the mucosa becomes thinner and atrophic. The alveolar bone has decreased capacity to remodel and blood flow is reduced.

There is an effect on developing dentition, in that some teeth do not develop and others have stunted development of roots. There will be a delay in or lack of eruption of teeth. These changes are dependent on the state of development of the teeth at the time of irradiation and the amount of radiation administered.

Dental care for people who have undergone oral radiotherapy includes a strict preventive regimen to counteract the effects of the radiotherapy. Each patient should have a dental evaluation before radiation. All teeth that are to be retained should be restored as needed. Indications for preradiotherapy dental extractions are greater than 50 per cent loss of alveolar bone, furcation involvements, deep caries, periapical infection, poor potential for proper oral hygiene and oral care, and molars that will oppose maxillectomy defect. Alveolar prominences and tori should be recontoured. Extractions should be done with radical alveolectomy and primary soft tissue closure.

Dental prophylaxis should be administered and the patient placed on a regimen of proper oral hygiene procedures with the additional application of fluoride gel on a daily basis, to be provided continuously. Treatment should be developed in such a way as to minimize the potential for postradiation extraction of teeth and to reduce the necessity for any oral surgical intervention in an area that has been radiated.

Placement of dentures on irradiated mucosa involves the potential risk of soft tissue necrosis and exposure of underlying bone with development of osteroradionecrosis. Smooth, well-contoured ridges that have had adequate time to heal after the surgery and radiotherapy provide the safest ridges on which to place prosthetic appliances. Recently irradiated areas where alveolar contours are not ideal run the risk of a higher potential for soft and hard tissue breakdown. Patients must be evaluated in terms of their potential for soft tissue breakdown and developing a prosthodontic treatment.

If patients have had teeth extracted for many years, have smooth ridges and good saliva, and have worn dentures for many years, they adapt more readily to the use of prostheses after having been irradiated. Patients who have had teeth extracted shortly before their radiotherapy, and have more irregular bone contours or mucosa that is inflamed or extremely atrophic, have more potential for complications. Such patients may routinely be required to wait for 6 months to 1 year after radiation therapy before dentures are constructed.

Prosthodontic appliances that are available in the management of head and neck cancer patients involve those that can be used during therapy to help position the cone in oral application of radiation. Such a positioner would provide a means of docking the cone in a reproducible position to guide the radiotherapy source directly to the area involved in the oral cavity.

Devices can be constructed to position certain areas of the oral cavity. The tongue may be pressed downward by an intraoral device to keep it out of the range of the field of application of the radiation. The tongue may be lifted posteriorly to expose the anterior floor of the mouth and again hold the tongue out of the direct field of radiation. Positioners can also hold the mouth at a set degree of opening to hold unaffected areas out of the field of radiation.

Radiation carriers are devices that hold the source in position to apply radiation to a specific intracavitary region. These are often used to supplement external beam therapy.

Shields can be developed with lead lining to reduce the application of radiotherapy to areas that are to be excluded from the radiotherapy. Soft tissue compensators are developed to allow the application of a more even dosage of the radiotherapy to a given area. Normally, these are developed to fill a cavity, providing a material of equal radiation absorptive capacity. These can be developed internally to fill a cavity or externally to augment an irregular surface contour.

Chemotherapy

Chemotherapy is used in addition to the radiotherapy and surgical modalities in treating head and neck cancer. The results of chemotherapy are seen in the oral cavity,

primarily in its effect on the oral mucous membranes. The antimetabolic activity of the chemotherapy has an effect on the mucous membranes, causing mucositis and ulcerations. These ulcerations are often an indicator of ulcerative activity throughout the gastrointestinal system and reveal the status of the chemotherapeutic effect.

The effect on the hematopoietic system reduces the number of platelets, and therefore gingival bleednig may occur. A low white blood cell count affects the ability to combat infection and leaves the patient more susceptible to infection.

Dental care is limited with patients undergoing active chemotherapy. Oral hygiene procedures may be limited to saline and bicarbonate oral applications with soft toothbrushes or cotton swabs. Various mouth rinses control the symptoms of the chemotherapy. Dental procedures should be coordinated with the patient's chemotherapeutic regimen so that they can be accomplished when the blood counts are in a most advantageous condition.

Head and Neck Surgery and Its Prosthodontic Implications

At no time should the surgical removal of pathologically involved tissues be compromised for prosthodontic reasons. Complete removal of the cancer is of paramount concern. However, once this concern is addressed, there are several aspects that can improve the prosthodontic result if they can be followed.

Maxillectomy

Surgery should be accomplished so as to retain as many teeth and as much ridge as possible. Keeping the anterior ridge or teeth by resecting lateral to the cuspid, as opposed to midline, greatly improves the stability and support of an obturator. The transection of alveolar bone should be made through the socket of an extracted tooth instead of between teeth, thus preserving alveolar bone to support the last remaining tooth. Palatal mucosa lateral to the midline bony margin should be retained and rotated superiorly to line the shelf of palatal bone, and extended upward along a denuded nasal septum to provide keratinized mucosal support for the obturator. Internal aspect of the cheek flap should be skin grafted, thus ensuring a lateral undercut for obturator support. The obturator will extend into the pocket that forms above the mucosa-skin graft line where scar formation develops a firm band. This provides a vertical support for the obturator. Resection of the coronoid process of the mandible on the affected side will provide a more stable lateral border of the defect. This will allow the obturator to seal more effectively and may help reduce postoperative trismus. Inferior nasal turbinate should be removed to provide adequate extension of the obturator and reduce nasal secretions.

A surgical obturator is used for immediate closure of the maxillary defect at the time of surgery. This obturator is made from a preoperative maxillary cast. The cast is altered to confirm with the projected surgical defect. Although it may restore missing dentition, it is more likely to fit accurately and require less alteration, and can be made more quickly if no teeth are placed. Secure support for the skin graft is ensured when the obturator supports the oral aspect of the defect. The defect may be filled with gauze impregnated with various antibiotic solutions, molded dental compound, or semirigid autopolymerizing methylmethacrylate.

The obturator is secured by circumdental, transalveolar, or circumzygomatic wiring; surgical pins; or palatal screw. At 5 to 8 days postoperatively, the surgical obturator and packing are removed, and the defect debrided and inspected. The obturator is modified to become an interim obturator, or a new prosthesis may be made to provide the interim obturator. This prosthesis will be modified as the patient heals and the buccal scar band forms. During this healing phase the prosthodontist instructs the patient on hygiene procedures, including care of the prosthesis and irrigation of the defect. During this phase dental maintenance procedures may be accomplished, such as oral prophylaxis, or hygiene instructions, fluoride applications and restorations. Oral physiotherapy is emphasized to reduce postoperative trismus. Nutritional counseling is provided.

When sufficient healing of the defect has been achieved, a long-term definitive prosthesis is made, usually of methylmethacrylate resin with the cast chrome cobalt alloy framework needed for dental retention. The prosthesis will extend deeply into the defect for retention and stability. Small obturators are made with solid acrylic bulbs. Larger obturators necessitate hollow construction or cup construction with thin lateral walls and no cap over the obturator, to decrease weight.

The obturator is intended to restore speech, swallowing, mastication and aesthetics to normal. As more of the aforementioned aspects of surgical considerations are achieved, a greater potential for reestablishment of full function is provided. Even with the most satisfactory results, however, there are some limitations. Chewing should be limited to the unresected side, to limit torquing forces on the obturator. Some movement of the obturator must be expected if there is no dental support and especially if there is limited alveolar support. The potential to support the cheek or orbital floor is dependent on the amount of dental and alveolar support available.

Soft Palate Resection

These surgical considerations relate to prosthodontic rehabilitation of soft palate resections. Removal of less than 25 per cent of soft palate may not require prosthetic intervention. A minimal lateral resection of the palate may provide adequate function by apposition to the remaining lateral pharyngeal wall, if attached by primary closure to the lateral pharyngeal wall with minimal tension, or by apposition to a flap reconstruction of the pharyngeal wall. A minimal posterior resection of the soft palate, confined to the area posterior to the region of flexure, will not materially affect velopharyngeal closure.

If more than one-half of the soft palate is resected laterally, the remnant will draw up and away from the defect in function and complicate the formation of the prosthetic closure. Complete resection would provide a more definitive area of pharyngeal wall activity to which the speech aid appliance is fitted. This would not be detrimental to the final result. Similarly, if more than one-half of the posterior aspect of the soft palagte is removed, the remainder of the soft palate should be excised, nearly to the bony palate. This allows the pharyngeal extension to be developed in a relatively horizontal plane from the hard palate back to the pharyngeal wall where velopharyngeal closure normally occurs. Leaving the anterior one-third of the soft palate would mean that a palatal strap might have to drop inferiorly to negotiate the soft palate at rest. This would place the strap in a position to interfere with tongue movement during swallowing and with linguovelar articulation in speech.

Placement of a prosthesis directly at surgery to compensate for resected soft palate is of limited value. The speech aid prosthesis must be molded by the dynamic activity of the remaining velum and pharyngeal muscles; this can be achieved 5 to 8 days after surgery. Placement of this temporary speech aid will be simplified if the patient has been seen preoperatively to construct an oral base for the speech aid appliance. Palatal and pharyngeal section may then be added at the first postoperative visit. The pharyngeal section is molded to replace the missing velum and seals against the pharyngeal wall in its active, constricted state. When the pharynx relaxes, the wall pulls away from the prosthesis. There is no contact with the prosthesis and nasal breathing can occur unimpeded. During speech and swallowing the velopharyngeal seal is reestablished.

Mandibulectomy

Marginal resections of the mandible are easier to restore prosthetically if soft tissues are replaced with skin graft or flaps, or are allowed to heal by secondary intention. Such treatment reduces deviation of structures such as tongue and buccal mucosa, which might otherwise be drawn over the affected area. Stable soft tissue over the resection area is needed for stable support of a dental prosthesis.

Lateral segmental resection involving the body and ramus of the mandible is relatively common. Proximal segments of condyle and ramus are drawn superomedially, and may impinge on the lateral aspect of the maxillary arch and interfere with the seal at maxillary prosthesis borders. Removal of these proximal segments should be considered, when surgical reconstruction is not planned. Prosthetic rehabilitation is progressively compromised as the line of resection approaches midline. The greater the amount of residual ridge and arch length retained, the better is the chance of adequate function. Anterior segmental resections exhibit very poor function and carry a very poor prognosis for prosthetic rehabilitation unless some form of reconstruction is employed to stabilize the lateral segments and restore anterior support for the tongue and lips. Intermaxillary fixation at the time of surgery reduces mandibular deviation. Exercises to prevent the development of trismus should be instituted early in the rehabilitation phases.

Patients with natural dentition may benefit from the use of a mandibular resection prosthesis of the guide flange type. A bar on an upper cast metal framework is placed to brace against the buccal aspect of the upper teeth. A flange is developed on a lower partial denture frame that will ride against the upper bar, to guide the closure of the mandible into the best occlusal position. Alternatively, a guide ramp may be placed medial to the upper teeth. A guide flange would dislodge a denture that has not dental fixation; thus, a guide plane would be the only useful option with complete dentures. Mandibular teeth contact the ramp and are guided down the ramp into occlusion with the maxillary teeth. A wide ramp may impede speech articulation. As the patient functions with the prosthesis, neuromuscular coordination improves, edema subsides, and tissues become more supple. As it becomes easier to close into ideal occlusion, the width of the ramp is decreased. This restores the contour of the palatal vault and improves palatal contour for speech.

Mastication will be limited to the posterior dentition on the unresected side. Even with anterior teeth present, there will be no contact during forceful occlusion, since the mandible rotates. The rotation causes the space between the anterior teeth to increase with increased

biting force. If the lateral aspect of the tongue has been fixed to the defect side, the tongue may not be able to manipulate the food bolus properly.

Use of soft tissue grafts instead of primary closure reduces mandibular deviation, reduces cheek deformity, allows greater range of motion of the mandible, and permits better tongue mobility. Myocutaneous pectoralis major grafts are very suitable for soft tissue closure in this application.

Glossectomy

Total or subtotal glossectomy produces a deficit in both speech and swallowing. Prosthetic restoration of the tongue can be accomplished by prosthetic replacement of the tongue or by modifying the contour of the palate. The palatal augmentation prosthesis reduces the tongue deficit by filling the void between remaining tongue and the palatal vault with a palatal base, which is increased in bulk to allow the tongue to contact it in speech and swallowing. This can improve speech and swallowing function.

Facial Resections

Facial prosthesis provide an alternative to surgical reconstruction of resected facial features. Removing the prosthesis provides access to care for the surgical site and allows visual access to monitor healing and potential tumor recurrence. Patients must be adept enough to care for the prosthesis, applying adhesives and manipulating and positioning it. They must be able to accept the need for a prosthetic restoration and to incorporate the prosthesis into their body image. When there are severe limitations in these regards, surgical reconstruction or alternative coverings should be employed. Prosthetic rehabilitation offers the potential for more aesthetic and functional results in auricular and orbital defects. Surgical and prosthetic results can be similar with nasal defects.

Surgical guidelines for facial resections incorporate the objective of developing a stable, firm, soft tissue base with even, regular contours. Placement of skin grafts at margins of resection prevent mucosal tissue from covering an area where adhesive must be applied to retain the prosthesis. Skin grafts can also provide a stable base when interposed between mobile tissue and the resected region. The skin graft also prevents migration of tissues such as lip or cheek with contracture or scar tissue. Placement of such a graft at the inferior margin of a nasal resection provides stable tissue for adhesive retention, limits respiratory mucosa to the nasal passages, reduces the influence of lip motion in prosthesis displacement, and prevents the upward displacing traction on the lip. Small tags of tissue complicate the patient's efforts to maneuver the prosthesis into proper position. Remnant tissues can compromise aesthetics if ideal contour must be distorted to fit over tissue prominences. Leaving the dorsum of the nose provides stable retentive tissue, but a bulky dorsum necessitates a very bulky nasal contour, which could be normal if a reduction of the dorsal contour is accomplished with the surgical resection. Prosthetic rehabiliation of orbital defects is enhanced if the eyelids are removed. The upper lid is often used to cover bone of the orbital defect. Not only is access to the defect enhanced, but adequate space is established to position the ocular portion of the orbital prosthesis.

A simple gauze dressing, adhesive or elastic retained eyepatch, or custom-fabricated prosthetic dressing is employed until all healing has progressed and soft tissues are stable. This is often at 3 to 4 months after surgery and or longer. When healing is complete, a facial impression is secured and a stone cast poured. A wax or clay form of the prosthesis is developed, which is invested and processed to form the prosthesis. Rigid methylmethacrylate or flexible elastomers of polyvinylchloride, polyurethane, or silicone are used to form the prosthesis. Base colors are incorportated into the material, which is characterized by additional surface coloring. Mechanical or adhesive retention is employed to hold the prosthesis in position. Regular removal and cleaning of prosthesis and adjacent skin is recommended.

Alternative Methods of Prosthesis Retention

Titanium fixtures, pioneered by Branemark, have shown to integrate reliably with bone. This concept has been utilized in placing dental implants with predictable results. Implants may be placed into dental, facial, and cranial bone to form anchorage for both oral and facial prostheses. Oral prostheses may be developed as a denture, supported and retained by mechanical or magnetic devices that are supported by the implant fixture, or as a span of fixed partial denture that is retained by screws into the implant abutments. A metal clip or magnets may be used in the facial prosthesis to fix the prosthesis mechanically into position. Conventional restorative techniques can adequately restore function and the aesthetic appearance for many patients with oral and facial defects. Osseous integrated implants offer a new option by providing a means of secure prosthesis fixation where conventional techniques have had limited success.