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J.A Smith
Peninsula Technikon

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By J. A. Smith

In partial fulfilment of BTech degree in Dental Technology

Student number: 200100304

E-mail address: koossm@yahoo.com

Contact number: 073 2211 682

Postal Address:

7 Lanzerote

58 Arum rd

Bloubergrand

7441
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Introduction and patient history

In 1971 a five-year-old boy was diagnosed with a bone tumour in his face. The tumour is called Hemangiopericytoma and is known to develop in the pelvic region but can really develop anywhere on the body. The tumour was surgically removed and resulted in the loss of his left eye, left ear and parts of various facial bones on the left hand side of his face. Since then he has been walking around with this severe facial defect that scarred him for life and as a result never gained the self-confidence to appear in public and be self supportive with his own source of income. His parents have been looking after him all the time.

Today he is thirty-eight years of age and a patient at Tygerberg hospital were his facial defect is being treated. We really hope for the patient to gain some self-confidence so that he can also experience the feeling of making his own money, walking in town, have dinner in a restaurant, have beer with friends etc. Everybody should be able to do every day’s things and to lead a healthy life style.
Discussion of treatment

Treatment started in the beginning of 2003 and is currently in progress. Various treatment options were considered such as bone transplants and plastic surgery but there were found that the patient will need too much bone and that plastic surgery will not work without the necessary bone support. There was decided on a maxillofacial prosthesis with an incorporated prosthetic eye and an ear attached to it.

The patient had a choice in prosthetic eyes. A custom eye could be manufactured for him and the eye colour can be matched accurately. This eye would cost around R8 000. This option offers excellent aesthetics of course. The other option is a prosthetic stock-eye. These eyes are easily available from the suppliers plus the eye colour could also be matched. They offer good aesthetics and only cost R280-00. The stock eye was obviously the patient’s choice.

The prosthesis will mainly be manufactured of a prosthetic resin called cosmesil. This material can be shaded according to the patient’s skin colour. It also has the ability to reproduce the wrinkles on the skin surface or to accommodate facial hair or an eyebrow in this case. It therefore produces quite a life-like appearance. More good properties of this material are that it is light in weight, economical, and will produce a prosthesis that will last for quite a number of years. This material will be moulded on top of a layer of hard acrylic. This acrylic base will be manufactured beforehand to be 1-2mm clear of the fitting surface of the skin to avoid deterioration thereof and also to prevent bacterial growth.
In the acrylic base, on the fitting surface, there will be attachments that will snap onto a bar that will be fixed to implants on the patients face. The surgeon decided to place three implants in the eye bank where the left eyebrow used to be, one in the left facial region of the maxilla, one in the nasal bone, and three behind the opening of his left ear. After the implants have completely osseointegrated and healed, only then can the prosthesis be manufactured. An all-new impression of the patient’s face, with the implants in place, must be taken and a new model must then be poured. This will be the master model on which the prosthesis will be manufactured.

First of all the metal substructure or bar must be manufactured of cobalt chrome. Ball attachments on the implants were considered but failed to provide even load distribution of the prosthesis to the face. This is the main reason for choosing the bar attachment technique. Furthermore, the metal substructure offers excellent stability. The bar will be made in such a way that it is possible to unscrew it from the implant heads for cleansing purposes. When the bar is polished and in place (on the master model), the attachments are placed over the bar. A layer of base plate wax is placed over the skin surface where the prosthesis will seat. This is to gain 1-2mm breathing space for the underlying tissue. The wax is also cut away from the implants. All the undercuts are then blocked out with wax, i.e. around the bar and on the screw heads. The acrylic will then be poured and cured on the model. A hole will be made in the acrylic to accommodate hearing, since a complete left ear will be manufactured of resin and will form part of the prosthesis.
The bar attachments will be held firmly in place by the acrylic and the base will also aid to stability. The facial side of the acrylic will be painted with a colour matched opaque pigment. This will also aid to the aesthetics of the prosthesis. With the resin in place, a very natural appearance will be obtained. The only factor that counts against the aesthetics is the edges of the prosthesis. A definite line in the patient’s face will be visible where the prosthesis ends. To counter this problem, the margin of the prosthesis will be manufactured to be in contact with the skin. This edge will only be 2-3mm in width to avoid irritation and too much tissue contact.

The manufacturer of the prosthesis could also keep in mind that the acrylic support of the prosthesis around the check must be shortened to facilitate facial movements such as speech, mastication, and expression. Movement in the prosthesis without dislodgment will provide even more of a life-like appearance. A prosthesis that moves with the body could be considered as cutting edge technology.

Conclusion

As part of the technical team, I can honestly say that I feel honoured to have had the opportunity in playing a role in the manufacturing process of a prosthesis that will give the patient a whole new perspective in life. Who wouldn’t like to experience the smile on the patient’s face with his first look in the mirror and the tremendous boost in self-confidence?
Reference

Branemark, P. and Tolman, D. E., Osseointegration in Craniofacial Reconstruction.