Original Research Paper Medical Science

Reconstruction of Left Anterior Wall Defect of Frontal Bone with Porous Polyethylene Implant – Case Report

Dr. Manoj Goyal	Dept. of Oral & Maxillofacial Surgery,Santosh Dental College and Hospitals,Santosh University,NCR Delhi
Dr. Mayank Singhal	Dept. of Oral & Maxillofacial Surgery,Santosh Dental College and Hospitals,Santosh University,NCR Delhi
Dr. J.S. Dua	Dept. of Oral & Maxillofacial Surgery,Santosh Dental College and Hospitals,Santosh University,NCR Delhi
Dr. Sanjeev Tomar	Dept. of Oral & Maxillofacial Surgery,Santosh Dental College and Hospitals,Santosh University,NCR Delhi

ABSTRACT

Background: *Bone reconstruction is thought to be dependent on skills, quality of soft tissues, size and location of the bony defect and choice of method of repair.*

Materials and method: *The aim of reconstruction was to achieve a lifelong, stable, structural reconstruction of the frontal and supra orbital margin with the help of H.D.P.E implant. Result: The deformity was well reconstructed and there was no implant migration or resorption.* ***Conclusion***: *Porous polyethylene has proved to be an alternative material to autogenous bone grafting.*

KEYWORDS : Polyethylene implant – H.D.P.E porous sheet

INTRODUCTION

It's a well known fact that frontal bone defects cause marked facial deformities, which become instantly obvious to the observer. Their use may be restricted due to limited amount of donor tissue available.

Porous polyethylene the simplest polyethylene synthetic polymer which can be used as an alloplastic material in craniofacial surgery. It is a versatile material used as a substitute for both bone and cartilage. It is insoluble in tissue fluids, does not resorb or degenerate, incites minimal surrounding soft tissue reaction and possesses high tensile strength. This material is easy to shape in warm sterile saline, is strong yet somewhat flexible, is highly stable and permits tissue in-growth into its pores. Ideally, the role of HDPE in reconstructive procedures is not only simply limited to replacing the missing bone part, but also to stimulate osteoconduction by acting as a scaffold for bone re-growth.

CASE REPORT

A 38 years old male patient reported to the deptt of oral and maxillofacial surgery for the correction left anterior frontal defect following gunshot injury 5yrs back. In past years the patient had undergone multiple operations to construct the defect but all had failed and orbital socket became so small that no eyeball/prosthesis could be fitted.

Figure 1: P.N.S view showing pellets

Figure 2: lateral view

The PNS and Lateral view was taken for defining the site and extent of the defect [fig1, 2].

Although patient was given a choice of autogeneous bone graft and alloplast ,he was explained about advantage and disadvantages of different graft.he chose alloplastic material .

The procedure was done under G.A, the incision was marked and the defect was approached through the old scar with medial extension over the supraorbital margin in order to expose the defect [fig3]. Complete exposure of the defect was done after removal of the fibrous tissue and the bullet pellet which was struck at the supraorbital rim area [fig4]. A template was made on lint piece to carve over the defect and was cut according to the size of the defect. First the titanium mesh was placed over the defect. Mesh was rigidly fixed using titanium screws through the fenestrations in the mesh [fig5]. Finally the porous sheet was placed in hot sterile saline for few minutes so that it could be cut and carved easily to the desired shape and size required over the defect [fig6]. After achieving the desired shape it was then fixed using titanium screws [fig7]. Haemostatis was achieved and closure was done in layers using vicryl and silk. Pressure dressing was done. The post-op recovery was uneventful. The patient was reviewed at regular intervals, initially once every week, followed by every two weeks and subsequently once in every month post-operatively. Post-op photograph showed restoration of the defect [fig8, 9, 10, 11].

Figure 3: Incision marking.

Figure 4: Complete exposure of the defect.

Figure 5: Fixing the titanium mesh with the help of titanium screws.

Figure 6: sculpturing the porous implant to finally adapt the supraorbital rim shape.

Figure 7: H.D.P.E was finally secured with help of titanium screws.

Figure 8: Pre-op frontal photograph

Figure 9: Post-op frontal photograph

Figure 10: Pre-op lateral photograph

Figure 11: Post-op lateral photograph

DISCUSSION

Many materials have been used for closure of such defects, including autogenous bone grafts, silicone, porous hydroxylapatite. The high-density porous polyethylene which is sintered to create a framework of interconnected pores, to permit ingrowth of bone, vascularity and soft tissues. Polyethylene is a highly inert material with smooth exterior surface (and irregular internal surface). It is not intended for large defects or in areas requiring load-bearing structural support.

Haluk Duman et al in their clinical series which comprised of 12 patients used porous implant for the restoration of frontal bone defect and contour. In eight patients coronal incision was used to explore the defect while in rest of the patients old scars were used to approach the defect. Only one patient stated that he could palpate the margins while touching the frontal area. Though, he was also pleased with his appearance.

Rubin et al experience with reconstructing the craniofacial skeleton and noted that porous polyethylene implant was well tolerated by the body.add more

CONCLUSION

It can be concluded that Porous polyethylene is the biomaterial available that meets the four criteria for a porous compound to be effective as an implant material: 1) biocompatible, 2) pores are large enough to allow for tissue in-growth, 3) pores interconnect with each other and 4) the structure of the implant is stable and rigid enough to maintain the porous framework under the conditions encountered at the implanted site. This material and the technique

described was found to be a simple and effective method for restoring contour deformities described and defects of the frontal area. The results obtained were aesthetically acceptable.

REFERENCES

1. Haluk Duman, Mustafa Deveci, et al ; "Reconstruction of contour and anterior wall defects of frontal bone with a porous polyethylene implant" Journal of Cranio-Maxillofacial Surgery (1999) 27, 298-301
2. Rubin JP, et al,; "Complications and toxicities of implantable biomaterials used in facial reconstructive and aesthetic surgery: a comprehensive review of the literature." Plastic Reconstructive Surgery 1997; 100:1336e53.
3. Yaremchuk MJ: "Facial skeletal reconstruction using porous polyethylene implants." Plastic Reconstruction Surgery 111:1818-1827, 2003
4. K. Sevin, et al,; "Exposure of high-density porous polyethylene used for contour restoration and treatment" British Journal of Oral and Maxillofacial Surgery (2000) 38, 44–49
5. Erik Neovius et al,; "Craniofacial reconstruction with bone and biomaterials: review over the last 11 years" Journal of Plastic, Reconstructive & Aesthetic Surgery 2 June (2009) 1-9