

MEDPOR Implants in Rehabilitation of Maxillofacial Defects

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ABSTRACT

Polyethylene or MEDPOR has many advantages for medical implants as a biomaterial and is applied to fabricate polyethylene implant which is of high density and porous in nature for facial and cranial reconstruction. It is semi crystalline polymer and with high fracture toughness. They are made up of straight chain which is aliphatic in nature. MEDPOR implant comprises of medical grade, high density polyethylene which is sintered to make a flexible framework of pores which are interconnected. The treatment of maxillofacial defects is tough due to technologies shortcomings which donot provide regular protocol to re establish patient-specific anatomy. Due to increase in usage of implants in various types in restorative dentistry, use as maxillofacial prosthesis has become famous, even proven beneficial in varied number of clinical management. The material being highly stable, flexible, porous, rapidly vascularized, tissue ingrowth property makes it sustainable for its use in maxillofacial defects and aesthetic surgery.

MEDPOR implants can be extensively used for ear, nose and orbital deformities. In cases of ear defects like microtia or complete loss of ear, in cases of trauma caused to nose while an accident or involvement of structures which are in close proximity with nose, eye loss or any other orbital or ocular defects MEDPOR implants has come out with flying colours.

Keywords: Soft tissues, Deformities, Costochondral cartilage, Polytetrafluoroethylene

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INTRODUCTION

Soft tissues maintains the integrity and facial harmony along with hard tissues. Facial implants provide facial harmony whenever there is trauma, congenital deformities and aesthetic surgeries. It is controversial that self-generated structures like ossein, cartilage, are ideal in facial augmentation. But, problems like donor site morbidity, difficulty in formation of grafts, maximal surgical time and complexity, graft warpage and resorption while using autogenous materials caused repeated use of alloplastic implants. Alloplastic biomaterials have disadvantages too; like hydroxyapatite biomaterial stops promotion of tissue growth, methylmethacrylate and silicone makes underlying bone prone to resorption, these materials leads to capsulation which results in migration of the implant. Recently, porous implants usage has been increased. Main advantage of this

material being tissue ingrowth. MEDPOR also called as Porous High Density Polyethylene (PHDPE) has many advantages as contrast to other alloplastic material. It was developed in 1970 and is clinically used since 1985. This implant has profit of more consistent 3 d definition without any need to harvest costochondral cartilage and make donor site [1].

Ultra high molecular weight has peculiar features such as low friction, high wear resistance, high toughness and is bio inert. Polyamides, polytetrafluoroethylene, polyesters, polyether ether ketone have higher coefficient of friction that that of polymer. Near about it makes the difference of half. Hence, UHMWPE becomes ideal material for long term implants. Its properties will deteriorate almost after 15 years. Size of pore ranges between 160-368 micrometer and almost three fourths of them are larger than 150 micrometer in diameter. It is also been said that this material enhances tissue ingrowth and collagen accumulation into these pores, that forms stable complex [2,3].

Polymethyl methacrylate shows varied number of properties such as,

- Easy in formation

- Can be used in areas which are non-loadbearing, hence material is strong
- Material is available in the form of sterile implant in pre-formed shapes

MEDPOR implants have been extensively used in orbital deformities, reconstruction of temporal defect after temporalis myofascial flap transposition, reconstruction of orbital blow-out fractures, damage in infraorbital nerve, nose deformities, chin hypoplasia, malar hypoplasia, in cases of open rhinoplasty. Depending on its properties, MEDPOR implant can easily substitute the existing implant materials [4,5].

LITERATURE REVIEW

Prosthesis Fabrication

Maxillofacial prosthesis fabrication include series of activity like data capturing and patient exclusive technological designing, fabrication and then its placement over the respective organ. Rather than using waxing or impression schemes, digital capturing and rapid prototyping is preferred owing to its speed, market profit value and accuracy in design. Computed Tomography or CT scan, 3D laser scanning are the methods studying the facial anatomy of the patient before his/her design phase. With the help of CT data collected, placing and trimming of molded prosthesis is made easy. To reduce the frequency of errors in design and to accelerate the surgical planning procedure haptic CAD systems can prove beneficial. For the evaluation of required area, measurements, morphology and architecture of tissue which was stable previously, topographic imaging is must in data collection process [6,7].

No doubt CT scan and MRI are the conventional imaging techniques, however some prefer usage of optical modeling as a safer way of collecting data because it minimizes the exposure to radiation. In more cases, requiring rebuilding of huge deformities or dodging sensitive essential constructions, virtual prosthesis should be planned utilizing contralateral surface as layout [8,9].

The prosthesis with mould and substructure can easily be fabricated. In a data collection and data elaboration phase, Ciocca utilized light lasers measurements on an auricular cast for the formation of 3D volume cloud. They also managed to rectify the abnormalities, made the irregular surfaces regular, proper organization of the points as well as removal of surface gaps from the virtual image in order to get retention. In an auricular prosthesis, collective units of single and implant is used. As referenced, bases for collecting and situating the last prosthesis are correspondingly planned. Later, the Stereolithographic (STL) information was transferred to 3 three dimensional printer [10].

DISCUSSION

Clinical Applications

Ear prosthesis: The complex structure of ear makes it difficult for the surgeons to recreate it in its original dynamic form. Microtia, an ear defect can result if the stapedius artery which arises from second brachial arch gets degenerated too soon. In some patients with microtia only helix and lobule are seen. Sometimes, microtia is related with hereditary disorders and hence assessment and documentation of syndromic components ought to be recorded just as review for hemifacialmicrosomia, pre-auricular pits, embellishment auricular extremities and aural atresia [11]. The auricular parts of the ear ought to be inspected and contrasted with the contralateral side. Reconstruction of third degree microtia is a demanding task because there is absence of the base tissue plus the new prosthesis must have durability. For this very purpose, many studies have been conducted so far and various techniques have come into account. Out of which autogenous costal cartilage technique is considered to be the conventional one due to its pros. But this technique needs a lot of craftsmanship and technical abilities with respect to surgeons while attempting to re-create a natural appearing ear however high density porous polyethylene (MEDPOR) is a better substitute for microtia cases. It is generally performed in very young children so life long prosthesis is expected from surgeons. MEDPOR implants permits a soothing ear fabrication with its exact anatomy replication, projection, symmetry and obviously long term viability. Moreover, it produces much less trauma and is less time consuming and produces an aesthetic, true ear [12].

Nasal Prosthesis

Patients recuperating from injury, just as those with innate distortions or a background marked by malignant nasal growth are the ones for whom this prosthesis may prove boon. Since the 1500s, such prostheses have been held to a great extent by non-long-lasting techniques, including glares for eye and cement products [13].

These may likewise fill utilitarian need, particularly when influenced region includes the maxilla or the sense of taste. In these instances, plan of replacement of nose, maintenance must think different recoveries that patient would require. Similarly their trust in is decreased when maintenance is not appropriate. Currently, literature provides numerous choices for maintenance strategies, like: Eyeglasses/display augmentations that connect with undermines in facial shapes, glues, connection to maxillary obturators and osseointegrated implants [14].

Contingent upon monetary status, a few tolerants might decide on more straightforward arrangement. An option in contrast to a medical procedure could be autopolymerizing sap maxillofacial prosthesis joined exhibitions. Acrylic paints are utilized for modification as indicated by epidermis tone. Finally well being and individual inclinations are utilized to customize the

techniques for reconstruction surface changes to coordinate with epidermis. Every patient is unique, with regards in location, dimension, etiology of imperfection, by and large cost-successful and tastefully great prosthetic restoration is best because of an insignificant pathologic repeat, intricacy of the careful reproduction strategy and dangers related with radiation therapy [15].

All the more as of late, osseointegrated inserts have turned into a treatment choice to furnish patients with a more long-lasting prosthesis. The endurance and achievement rates for such embeds have been depicted in the writing. The most well-known unfavorable result for extra oral inserts have been demonstrated to be delicate tissue infection. Lifelong development and support of such embeds will be vital, to guarantee early location of complexities and coherence of patient nature of life.

A 6 year tolerance rate, portrayed by Roumanas et al., was 87% for piriform and nasal inserts. Creators noticed it to be feasible to achieve more tolerance costs of inserts of piriform, potentially locales of nose, in all actuality that cautious radiographic and preoperative arranging is finished. In review of twenty eight medical help communities making such prostheses uncovered some prosthesis of nose were set for dependable gauge of pattern on connection use. There is an assortment of connection choices for embed held prostheses, including clasp, magnet or other maintenance techniques. More examinations are needed for deciding best connection method for patients with embed held prostheses.

Embed beneficiary site is one more factor for reproduction of facial imperfections. Generally, the nasal-bones, premaxillary region and the foremost mass in the front facing sinus has been a position for embed arrangement for analogue of nose. For example, Proussaefs, studied front facing cycle of upper ossea of oral cavity utilized as site for one embed whereas premaxilla being location for two extra substitutes. Bar associated with 3 inserts as well as prosthesis of nose which is not fix was connected to bar with 2 clasps. Following a year, no indications of unfriendly results were present. Likewise, the zygomatic curve might be a likely site for embed position, particularly in patients with oral hole or in patients with upper lip diseases needing excision. More examinations ought to be completed in near future to think about original locales of embed arrangement.

Inserts provide hopeful reconstructive results in some patients. In any case, assumptions ought to be altered dependent on the patient's socioeconomic. In an investigation of 111 inserts set for nasal imperfections, age, gender and cancer histology didn't influence the result. Interestingly, other key segment factors can obviously impact embed result, which include weed burning, degree of nose removal, utilization of high energy radiation. With alteration of imperfection following rhinectomy, capacity for securely putting clean delicate tissue unites with great essential steadiness expanded. For enormous, full thickness nasal imperfections, embed held prosthesis is ideal choice.

These are made with three dimension printing strategies, customary silicone, different techniques which intently reenact patients unique provisions. Computer aided design/CAM can enjoy numerous upper hands over regular procedures, including expanded accuracy, biocompatibility and lower costs.

Considering the physical and reconstructive necessities of the patient, it is the assessment of the creators that achievement rates are by and large useful for facial recreation and that most embeds can hold their related prosthesis and that such embeds are a suitable option in contrast to autogenous reproduction. Likewise, restoration with single-stage osseointegrated inserts and prostheses utilizing inherent pigmentation might have the option to offer quick treatment time and tasteful confidence.

Ocular Prosthesis

In the wake of losing an eye, the mental impacts will in general give a more prominent test than the genuine loss of capacity. Eye misfortune is generally connected with a few unique causes, like injury, glaucoma or malignancy. At the point when careful enucleation is shown and is operated, the whole eye just like part of the second cranial nerve are eliminated. Contingent upon degree of harm or injury, hard backings may likewise be eliminated. These outcomes in compromised feel and deficiency of volume. Nowadays, intraorbital inserts formed of nonporous hydroxyapatite or permeable materials are used notwithstanding style, these materials should be scratch safe and simple to clean. In the event that a prosthesis neglects to outfit these attributes, the outer layer of the prosthesis is inclined to microbial gathering and biofilm arrangement, eventually prompting aggravation and contamination. Luckily, such complexities are generally uncommon.

The objective of is to reestablish patient's style, limit mental impacts of eye absence, keeping up with soundness of the excess structures. Before having prosthesis, some might need extra content substitution by dermis-fat unites outspread lower arm flaps. Extensively tough as well as delicate tissue annihilation might need orbital operation, wherein edges of resection stretches out past the orbital locale, with front facing bone as well as divides cheek. Because of enormous volume of the spaces, hard for reestablishment through recently recorded customary methods. Utilization of osseointegrated inserts significantly worked on the maintenance and backing of these prostheses, delivering required esthetics. But, orbital embed upheld visual prostheses are not liberated from confusions, for example, peri-implantitis, delicate tissue irritation are failures.

Patient specific plate is made utilizing an autopolymerizing polymethyl resin. Despite of type of tray, visual plate should adapt in spaces. In focal point of plate, needle was appended which permitted material for effective infusion into attachment. The impression material is alginate. Attempting the wax in the eyes takes

into account assessment of tissue variation and corneal unmistakable quality. When the nuts and bolts are set up. An iris coordinating with the neighboring eye is included the situation of the contralateral gaze. Design is flasked, loaded with polymer. As far as tasteful authenticity, the shade of iris is apparently major part of substitute aesthetically. The iris is made utilizing colors, oil based paint, reasonable light fix material. To more readily coordinate with the corresponding eye, face to face visual examination is performed. To save the uprightness of the different tones utilized, each layer is painted and restored independently. Then again, the iris can be made through advanced imaging. It needs significantly lower ability as compared to artistic creation procedure. Critically, tasteful outcome is similar. The sclera is likewise shading coordinated to the contralateral eye. Red nylon strands are likewise added to give presence of veins. These means are very time intensive.

Development of orbital embed upheld visual prosthesis is basically the same as an ordinary prosthesis. Inserts are set to help with ideal situating of the prosthesis, referring to a characteristic eye position, cover form and stylish subtleties that copy the contralateral eye. Unfortunately, orbital embeds regularly show less fortunate forecast contrasted with inserts. A few kinds of connection are utilized for embed and prosthesis. By utilizing attractive connection, weight on the embed framework might be decreased while as yet keeping up with work. Traditional connections are utilized for amazingly huge tissue surrenders yet is stayed away from any place workable for patient straightforwardness. On the off chance that another prosthesis is made later on, similar inserts can be utilized. The detriment of the attractive embed upheld prosthesis is the at first added lab time and cost. This, notwithstanding, is decreased after some time because of the simplicity of making new prostheses, expecting the inserts are successful. Various studies have been done on this topic at my institute.

CONCLUSION

In this article we have discussed about MEDPOR or polyethylene. Its various pros and cons have been precisely mentioned. When compared with other materials, the advantages of this materials are more. It is well accepted by the patients and clinicians can handle it efficiently plus this material provide aesthetics as well as it has fulfilled many of the requirement. Ultra high molecular weight has peculiar features such as low friction, high wear resistance, high toughness and is bio inert. Polyamides, polytetrafluoroethylene, polyesters, polyether ether ketone have higher coefficient of friction that that of polymers by the patients. Ideally any material that is to be used should be inert, should not get decayed, anti allergic and having anti inflammatory properties. Substitute should get merge with soft and hard structures surrounding it. MEDPOR is user friendly, easy to remove and insert. It is pure complex and doesn't

degrade easily. A long term restoration provides remaining healthy dental tissues.

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