Abstract

Educational Objective: At the conclusion of this presentation, the participants should be able to recognize and address long-term infectious complications involving porous polyethylene implants used in oncologic maxillofacial reconstruction. Objectives: We describe our experience with delayed infections of porous polyethylene (Medpor) implants used after oncologic maxillofacial reconstruction. Study Design: Retrospective case report. Methods: We reviewed clinical presentations, radiographic findings, microbiology, treatments, and outcomes of patients who developed delayed infections of Medpor implants after maxillary reconstruction. Results: Two patients were identified requiring unilateral total maxillectomy and Medpor reconstruction for an ossifying fibroma and squamous cell carcinoma, respectively. The surgeries for both patients were successful without complications until six and four years later, respectively. The first subject did not require adjuvant therapy and was followed annually with interval CT scans that showed no recurrence of tumor or inflammatory changes. The second subject underwent adjuvant chemotherapy, but was lost to follow up one year after resection. Subjects presented with infection of implant at a mean of five years following maxillectomy. Both patients presented with swelling, drainage and erythema at the infraorbital region where the Medpor implant was located. Both failed minimally disruptive management including multiple rounds of IV antibiotics and incision and drainage. The implants were removed at a mean of 2.5 months after infection and replaced with matrix orbital floor plates. Cultures of removed Medpor implants demonstrated alphahemolytic streptococcus in the first case and multiple organisms in the second (Escherichia coli, Proteus mirabilis, coagulase negative staphylococcus and Candida tropicalis). Conclusions: Medpor implants are commonly used for facial skeletal reconstruction due to its reported biocompatibility, fibrovascularization and durability. While uncommon, late implant infections are usually secondary to bacteria seeding from another active source (e.g. dental infection) or exposure to upper aerodigestive tract. An important consideration before using the porous polyethylene implant after oncologic resection is their potential to develop infection resistant to systemic antibiotic treatment years after implantation. Further studies and long term clinical follow-up after implant reconstruction is critical to ensure early diagnosis and treatment.

Methods and Materials

This was a retrospective chart review using EPIC® (Epic Systems, Verona, WI, USA) and SUNRISE® (Allscripts, Chicago, IL, USA) in which we reviewed clinical presentations, radiographic findings, microbiology, treatments, and outcomes of patients who developed delayed infections of Medpor implants after maxillary reconstruction.

Case Report 1

A 63-year-old woman with a history of a 4 cm ossifying fibroma of the left maxillary sinus underwent a left total maxillectomy in 2009, excluding the medial aspect of the orbit and medial hard palate. DermaMatrix was placed to line the posterior wall of the left maxillary sinus defect and Medpor implants were used to reconstruct facial contour, left maxilla and orbital floor. (Figure 1-2) The patient tolerated the procedure well without peri-operative complications. After routine post-operative care including ICU and floor convalescence, the patient was discharged home seven days post-operatively. She followed up annually in clinic with only minor complaints of left facial pain. Post-operative CT scans showed no evidence of recurrence with and expected post-surgical changes. Within a year after surgery, she experienced frequent dental pain and infections that resolved with outpatient (PO) antibiotics. Early 2015 (six years after implantation), she presented with swelling, drainage and erythema under her left orbit. Minimally disruptive management was initiated with incision and drainage followed by multiple rounds of IV antibiotics. Given persistent infection the implant was removed three months after infection presentation. A wound culture of explanted material was positive for alpha-hemolytic streptococcus. Although the culture may have represented a skin contaminant, alpha-hemolytic streptococcus is often seen in foreign body-related infections. Two weeks later, a low-profile metallic matrix orbital floor plate was implanted to help reconstruct the left maxilla. The patient continues to undergo reconstruction consultation to improve the acquired lagophthalmos and “sunken” appearance of the left face as of 2016.

Case Report 2

A 61-year-old male with a history of T2N2bM0 squamous cell carcinoma of the left hard palate underwent two courses of induction chemotherapy followed by a left total maxillectomy in early 2011. The maxilla was reconstructed with a malar cheek and orbital floor implant from Medpor (Figure 1-2) and a palatal prosthesis was placed. The patient tolerated the surgery well and after routine post-operative convalescence, he was discharged without complications four days after the operation. The patient underwent adjuvant chemotherapy and radiation without treatment breaks, but subsequently lost to follow up by late 2011. In 2015 (four years after implantation), the patient presented with complaints of left lower eyelid swelling and two active draining pustules (Figure 3) which had been present for two weeks. Physical exam demonstrated orbital fistula (Fig 4). Patient had continued purulence and pain after minimally disruptive management using incision, drainage and IV antibiotics (Figure 5-6). In 2016, the implant was removed (two months after infection presentation). A 0.4 mm metallic orbital plate was implanted to replace the Medpor implant. Cultures taken from the explanted malar implant were positive for Klebsiella pneumoniae, Proteus mirabilis, Citrobacter koseri, coagulase negative staphylococcus and Candida tropicalis. Cultures taken from the orbital floor implant were positive for Escherichia coli, Proteus mirabilis, coagulase negative staphylococcus and Candida Tropicalis. The patient was given post-operative IV antibiotics with complete improvement of infection. He continues to follow up and has not had recurrence as of 2016.

Background

Reconstruction of tissue loss following trauma or oncologic resection often requires human tissue or artificial materials. Porous high-density polyethylene (PHDPE, Medpor®), Porox Surgical, Newnan, GA, USA) implants were introduced in the 1970s and offered benefits over autogenous tissue including no donor site morbidity, more customizables, and minimal foreign body reactions. Medpor implants are a currently well-accepted alloplastic material for orbital and craniofacial reconstruction given ability to better restore facial contour and characteristics that decrease the likelihood of infection, exposure, or exclusion. It has an average pore diameter greater than 150 μm (above the standard 100 μm), which enables a more rapid fibrovascular proliferation into the implant and proliferative ingrowth of both soft tissue and bone. This allows the immune system to respond to infection and an avenue for systemic antibiotics to reach the implant. In a previous study of a review of 314 cases, only 1% (3 patients) had infection complications. In addition, Medpor has a hydrophobic and negatively charged surface that acts as a protective envelope to inhibit adherence of bacteria. However, it is possible for an abscess to develop in the internal lacuna of Medpor, and connective tissue may erode due to the rough surface. This potentially allows for complications occurring late in the postoperative period. These delayed infections are infrequent and are generally described in isolated case reports within ophthalmology and craniofacial trauma. Further, patients undergoing oncologic resections, reconstruction, and adjuvant therapy may have an increased susceptibility due to local and systemic immunocompromise. Currently, few studies have described delayed complications of Medpor reconstruction following oncologic maxillofacial.

Conclusions

Medpor implants are commonly used for facial skeletal reconstruction due to its reported biocompatibility, fibrovascularization, and durability. While uncommon, an important feature of the porous polyethylene implant is their potential to develop delayed infection resistant to systemic antibiotic treatment requiring explantation. Ostensibly as the life of the implant increases, breakdown of the material can take place and allow an infection to seed to that area. Late implant infections are usually secondary to bacterial seeding from another active source (e.g. dental infection) or exposure to upper aerodigestive tract. Adjuvant therapy may also increase susceptibility to infection given relative local and systemic immunosuppression. Infections of local tissue including oral cavity and orbit raise concern for infections seeding to implant. Given this potential for delayed complications 5 years after implantation, long term follow-up is imperative when deciding to use porous polyethylene implants for oncologic reconstruction.