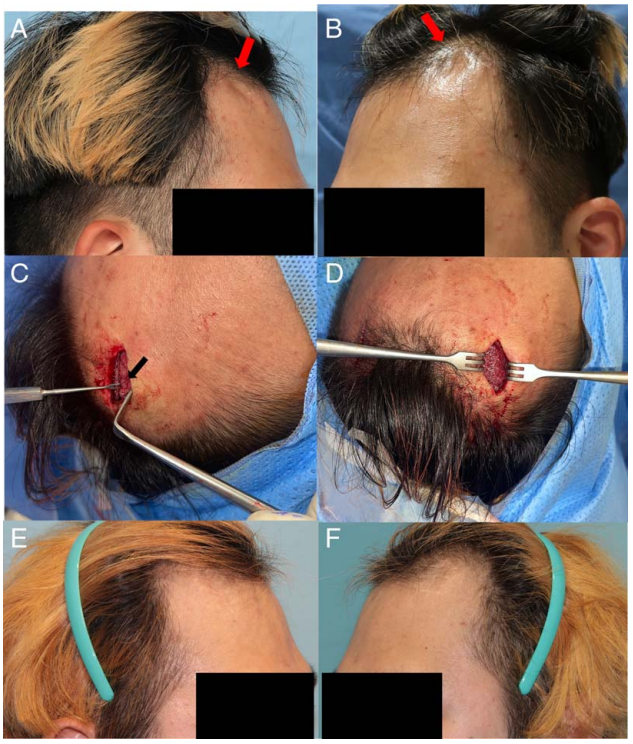

FIGURE 1. Clinical photographs. (A) Preoperative photograph shows depressed scars on the right side of the forehead (arrow). (B) Preoperative photograph shows depressed scars on the left. side of the forehead (arrow). (C) The allogenic cancellous chips were packed into each bony defect (arrow). (D) Porous polyethylene implants were overlying the cancellous chips. (E) Postoperative 7 months photograph shows recovered depressed scar on the right forehead without complications. (F) Postoperative 7 months photograph shows recovered depressed scar on the left forehead without complications.

However, despite their minor size, these defects could result in bothersome cosmetic problems and may be considered a stigmatizing mark by some patients.[2,4] Many materials have been introduced to repair such defects, including organic substitutes such as autologous bone, muscle, or fatty tissue; synthetic substitutes such as polymethyl methacrylate, hydroxyapatite, or polyethylene; and metallic substitutes.[5] Organic substitutes are highly compatible but have many drawbacks, such as donor site morbidity, a time-consuming process, and difficult application. Polymethyl methacrylate can be applied easily; however, the exothermic reaction created when mixed with a catalyst is toxic to the surrounding tissues. Mineral graft hydroxyapatite is not toxic to the tissues and has osteoconductive properties; however, it is too brittle and is easily resorbed when cerebrospinal fluid or water is present.[6,7] Recently, various materials, including allogenic acellular dermal matrix, have been introduced for immediate burr hole defect reconstruction.[1,3] However, burr hole cover can be applied immediately, followed by burr hole surgery because the shape of burr hole cover should precisely fit the skull defect area. For the old burr hole defect, it is difficult to trim the defect according to the burr hole cover shape. In this case study, we reconstructed an old, depressed scar with a small skull defect using a titanium-reinforced porous polyethylene implant and allogenic cancellous chips. The porous polyethylene titanium-reinforced implant is biocompatible, easily contoured, and placed. The porous architecture enables the ingrowth of vascularity and soft tissue, forming a stable interface that anchors the implant.[8,9] We applied the alloplastic cancellous bone as an inlay graft. After hydrating the hard bone block, we chopped it into a sponge-like material and filled the debrided healthy bony defect with it. This helps cover the defect by acting as a scaffold for the host bone to grow.[10] Subsequently, we applied the porous polyethylene titanium-reinforced implant as an onlay graft to maintain the position of the inlay graft. The titanium-reinforced porous polyethylene was easily molded and applied according to the curvature of the patient's skull.

CONCLUSION

In this case, even in a previously healed bone, the defect was successfully repaired using a simple method involving an allogenic cancellous chip and a porous polyethylene implant. Regardless of the age of the bony defect, successful filling can be achieved by using the appropriate material in the right location, leading to a cosmetically satisfactory surgical outcome.

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Periosteal Turnover Flap for Coverage and Salvage of Exposed Deep Brain Stimulation Device

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Abstract: Implanted deep brain stimulation (DBS) devices are crucial in the treatment of movement disorders. Hardware extrusion is among the most frequent complications of the implantation process and requires reconstruction with well-vascularized tissues. The authors present a case of periosteal turnover flap for coverage of an exposed DBS device. An 11-year-old female patient with spastic cerebral palsy presented with an exposed DBS device located in the right parietal area. The exposed device was covered by a proximally based periosteal flap. Postoperative evaluations at months 1, 2, 3, and 8 revealed no signs of infection or dehiscence. This brief clinical study shows that reconstruction with periosteal turnover flaps is both an easy and excellent choice for secondary closure of exposed DBS devices.

Key Words: Flap coverage, implant extrusion, periosteal flap

Implanted deep brain stimulation (DBS) devices are crucial in the treatment of movement disorders, for example, Parkinson disease, cerebral palsy, etc.[1–3] . Although extremely useful, these devices are foreign materials and need to be covered with well-vascularized tissues. Primary closure of the overlying scalp flaps after irrigation and/or implant renewal is accepted as the routine approach when closing such defects, but this approach is susceptible to high incidences of complications such as hardware extrusion.[2,3] There is a 2.5% to 12.9% rate of hardware extrusion at the scalp, and the risk of infection can reach 60%.[2,3] Since the scalp is relatively thin, exposure of such devices can be a complicated problem for both the patient and the surgeon, leading to longer recovery time, higher incidence of infections, and the need for additional surgical and nonsurgical interventions.[2,3] Management of extrusion, as well as its prevention in the scalp area requires reconstruction with the use of well-vascularized tissue,[2–5] such as periosteal flaps.

In this study, authors present a novel surgical method for the closure of exposed DBS devices in the scalp, using patients' own tissue and covering the DBS device with a periosteal turnover flap, which addresses the main objective of covering the defect and minimizing the risk of reinfection.

CASE REPORT

An 11-year-old girl with spastic cerebral palsy was referred to the clinic with an exposed DBS device located in the right parietal area (Fig. 1A). The patient was severely cachectic, with weight and height below 3 percentile and a body mass index of 11. She was bed-bound with generalized dystonia. Due to neurogenic dysphagia, she was fed via a percutaneous endoscopic gastrostomy catheter. There was no sign of active infection, but a 3×1 cm scalp defect with serous discharge was observed. Implant salvage was intended, given the lack of active infection and the short history of exposure. The patient was operated and discharged on day 5 without any complications. During long-term follow-up (8 mo) there was no sign of exposure or reinfection.

SURGICAL TECHNIQUE

Under general anesthesia, local anesthetic solution containing adrenaline was injected in the subgaleal plane around the exposed device. An S-shaped incision was made on the right parietal area to expose the device using 2 double opposing transposition flaps. Implant capsule was excised with care taken to preserve the cables of the device. After irrigation with saline, a 6 cm×4 cm proximally based pericranial flap was elevated using a periosteal elevator with its base parallel to the long axis of the device (Fig. 1B). The flap was turned over to cover the device as a separate layer (Fig. 1C). Then the 2 flaps raised to expose the surgical area were adapted to each other in double opposing fashion (Fig. 1D). Skin was then closed using appropriate suturing, resulting in an S-shaped scar on the right parietal area (Fig. 2A). Postoperative evaluations were performed at months 1, 2, 3, and 8 and revealed no signs of infection or dehiscence (Fig. 2B, C).

DISCUSSION

Any exposed implant presents a reconstructive problem for the surgical team. Deep brain stimulation implants are vital for a variety of patients with movement disorders. When placed under the scalp, these implants can be exposed due to pressure created by the device itself.[1,2]

Generally, the presence of gross infection and purulent drainage affects how extrusions are managed. Debridement, hardware removal, and suitable reconstruction should be carried out if a gross infection is evident. Yet, there is no agreement on the best course of action if there isn't an obvious infection.[6–7]

Moreover, malnutrition is a common problem in this patient group, leading to cachexia and causing them to have thinner scalp flaps, which makes them more susceptible to implant exposure and renders reconstruction more challenging. This is mainly caused by insufficient amounts of healthy tissue and wound healing problems.[8]

Once exposed, foreign materials are quickly colonized and covered by biofilm, even when there are no apparent signs of active infection such as purulent drainage.[7] Biofilm layer arguably triggers re-exposure after reconstruction; therefore, any coverage option should be well-vascularized and resistant to both infection and mechanical forces.[7] Any salvage attempt should be performed in a quick manner to avoid increased colonization and infection since these implants have a direct connection with intracranial structures.

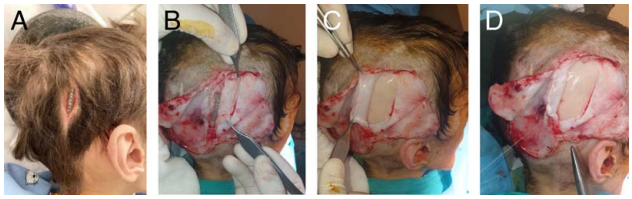

FIGURE 1. Exposed deep brain stimulation device (A). A quadrangular periosteal flap was designed and elevated (B). The periosteal flap was turned over (C). Flap was sutured to wrap the exposed deep brain stimulation device (D).

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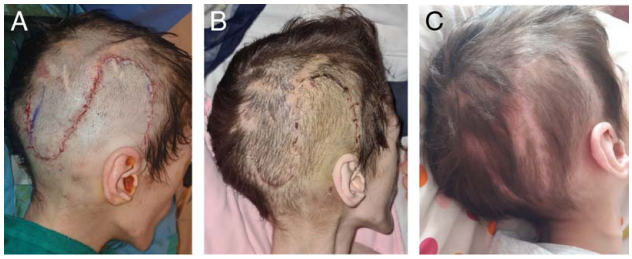

FIGURE 2. Early postoperative appearance following appropriate closure of remaining scalp layers (A). Postoperative second (B) and seventh (C) month appearances of the operative field showing no signs of implant exposure or infection.

Whenever possible, implantable devices are recommended to be placed under the muscle or deep fascia. Since the scalp has relatively negligible muscle or muscle-like tissue, we designed and performed a turnover flap using healthy periosteum to cover an exposed DBS implant as a separate vascularized layer. Since the distal part of the flap is harvested far from the device, it is uncolonized and provides a separate barrier between the device and local scalp flaps.

CONCLUSION

Periosteal turnover flap is a valid and convenient method to salvage exposed DBS devices located under the scalp, functioning as a separate vascular barrier and coverage while minimizing the risk of infections.

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Acellular Dermal Matrix, Osseoplastic Flap, and Transnasal Endoscopic Approach for Frontal Mucocele

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Purpose: The primary objective of this study is to suggest the use of acellular dermal matrix through an osteoplastic flap and transnasal endoscopic treatment for the management of frontal mucoceles. The secondary objective is to propose the characteristics to choose this approach.

Methods: A retrospective cohort study was carried out on patients with frontal mucoceles of different etiologies where an osteoplastic flap was made to address the sinus and subsequently obliterated with acellular dermal matrix.

Results: A cohort of 11 patients were included in the study, 6 (67%) were female and 5 (56%) were male, with a mean age of 56 years (range 35–71). The majority of patients (73%) with a history of trauma and all the patients were treated with frontal osteoplastic flap and obliteration with acellular dermal matrix. No evidence of recurrence in a follow-up period with a mean of 18 months and a low rate of complications.

Conclusions: The frontal osteoplastic flap and obliteration with acellular dermal matrix is a simple and safe technique to perform with low morbidity. Also, an orbital reconstruction can be performed simultaneously.

Key Words: Frontal mucocele, frontal sinus, osteoplastic flap

The frontal osteoplastic flap was described in 1894 by Schonborne for the open management of inflammatory pathologies of the frontal sinus.[1] Subsequently, Winkler in 1904 and Beck in 1908 described the use of a radiographic template with a size of 1:1, to precisely design the osteoplastic flap in the frontal sinus.[2,3] However, its popularization in the management of sinus pathologies was due to Goodale and Montgomery in 1956, who described defunctionalization by obliteration of the frontal sinus ostium with abdominal fat.[4]

Recently, the endoscopic management proposed by Draf in 1982 has been proposed.[5] Although the endoscopic approach is a minimally invasive option, it is not feasible to use it in all cases. Furthermore, it requires additional equipment and

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