Original Article

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POST MASTOIDECTOMY BRAIN FUNGUS: REPAIR WITH TITANIUM MESH

Abstract:
Fungus cerebri by definition is an ulcerated cerebral hernia with granulation tissue protruding from scalp wound. But it can happen at any skull base defect like roof of the middle ear cleft and roof of the nose and sinuses. Fungus cerebri in ear is a rare occurrence in clinical practice. We present a male patient who underwent modified radical mastoidectomy and suffered brain herniation into the mastoid cavity which was repaired using titanium mesh. Tegmen tympani repair using titanium mesh by transmastoid approach is helpful in repairing defects up to 2 cm in diameter. We propose the use of titanium mesh for the reconstruction of tegmen plate defect via transmastoid approach is useful in larger defects.

Key words: Tegmen antri defect, Fungus cerebri, Titanium mesh

INTRODUCTION:

Cerebrospinal fluid (CSF) leaks, meningoceles, and meningitis are worrisome complications of skull base defects, regardless of whether they are congenital, traumatic, neoplastic, or iatrogenic. These defects are repaired through transmastoid approach, a limited sub temporal craniotomy or through a combined transmastoid and sub temporal approach. Combined cranioplasty techniques are used to treat larger bone defects.[1] Several materials have been used to reconstruct bony defects of the lateral skull base: autologous and homologous cartilage or bone, lyophilized homologous dura mater, pre-formed hydroxyapatite (HA) blocks, titanium or carbon fiber mesh, and myofascial pedicled or distant free flaps. Each material has unique advantages & disadvantages that can lead to failure of the implant, adverse reactions, or complications.[2] We report here a case of brain fungus in post mastoidectomy patient which was repaired with titanium mesh. The relevant literature is also reviewed.

CASE REPORT:

A 17 year old male presented with unsafe chronic suppurative Otitis Media (CSOM) with post aural abscess in the right ear for which he was operated in our hospital. Intraoperative, sub periosteal abscess along with cholesteatoma was seen occupying the antrum, aditus and attic. The tegmen antri was deficient and the defect further increased as result of drilling of the dead and necrotic bone but the dura was intact and there was no CSF leak. Modified radical masoidectomy was done with wide meatoplasty. He remained asymptomatic for six month and then he was lost to follow up. He presented two years later with a mass in the same ear. On examination whitish, cystic mass was seen filling the cavity and external auditory canal. CT scan revealed a defect in the tegmen antri and the brain tissue was seen occupying the mastoid cavity and filling the external auditory canal (Fig1.). The patient was taken up under general anaesthesia and mastoid cavity was opened again. The CT findings were confirmed and the dural defect was delineated .The herniated brain tissue was exposed, coagulated and sectioned .The repair of the bony defect was effected from below by inserting conchal cartilage through the defect and then covered with temporalis fascia. As the defect was large and the chonchal cartilage was seen bulging down due to the pulsations of the brain hence a decision was taken to strengthen the closure with titanium mesh instead of cartilage (Fig. 2.). Postoperative period was uneventful and patient is disease free two year postoperative. There was no evidence of extrusion or foreign body reaction to the titanium mesh.

DISCUSSION:

Herniation of meningeal and brain tissue into the temporal bone through a bony defect is a rare and potentially life threatening condition requiring surgery. The existence of a pathway from middle ear to subarachnoid space can lead to potential infectious sequelae including meningitis, encephalitis, and otogenic cerebral abscess.[3,5] The existence of a tegmen defect is considered a prerequisite for the development of meningoencephalocoele. The etiology of this defect may be chronic otitis media with or without cholesteatoma, head trauma, previous otologic surgery, and spontaneous brain herniation. With a defective middle fossa floor, increased intracranial pressure can lead to the herniation of meninges and brain tissue into the middle ear or mastoid cavity.[6] The choice of the most appropriate surgical approach must be based on the localization and size of herniated tissue, preoperative auditory function, presence of active infection, CSF leak and concomitant pathology.[7]
Imaging modalities are useful to make the diagnosis of brain herniation through a tegmen defect. Repair is accomplished either from above by middle cranial fossa approach, from below by way of transmastoid approach using autologous fascia, cartilage, bone or combination. Prolapsed brain tissue is often non-functional as a result of strangulation, ischemia and edema, so it can usually be safely excised.[8,9]
The transmastoid approach is best for posterior and lateral defects of the tegmen (tegmen mastoideum) or small defects of less than 1 cm. A middle cranial fossa approach is best for medial and anterior defects of the tegmen (tegmen tympani), large defects over 2 cm or multiple defects.[12] Many combinations of autologous tissue (i.e., fat, muscle, fascia, bone and cartilage) can be used.[13,14] The dural defect can be repaired using a thick connective-tissue graft, such as temporalis fascia, pericranium and fascia lata[15]. The tegmen can be repaired with bone or cartilage grafts and obliterated with pedicled flaps like Palva flap or free temporalis muscle.[10,12]. Alloplastic materials such as silicon, oxycel cotton, bone wax and fibrin glue can also be used. The techniques involved in repair included single-layer and multilayered closures.[11] Since the defect in our patient was in the tegmen antri and the size was about 1.5 × 2 cm, we decided to use a transmastoid approach. The tegmen was repaired with titanium mesh.

Titanium (Ti22) was discovered in 1791 by William Gregor in England and is a soft metal, very resistant to corrosion, used in various alloys of iron, vanadium, aluminum, etc. It is a soft metal, very resistant to mechanical forces and fully biocompatible and corrosion resistant. These properties make the material of choice today in cranial and

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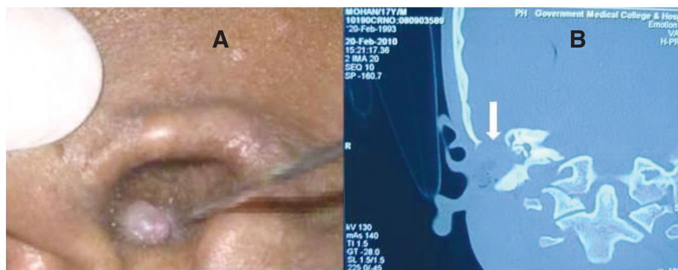

Fig. 1. Clinical photograph showing polypoidal mass in external auditory meatus (A). Coronal scan showing defect in the tegmen (white arrow) and mass filling the mastoid cavity (B).

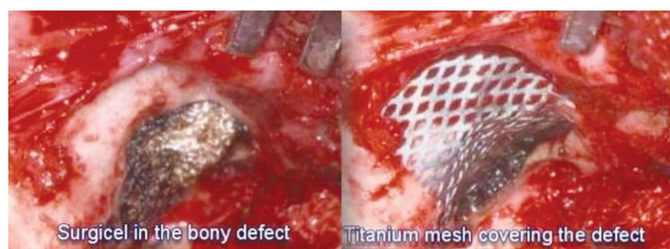

Fig. 2. Intra operative photograph showing tegmen defect and it repair by titanium mesh.

spinal prosthesis.[16] The titanium is considered the most compatible metal and can be easily integrated in the human body. Another property of titanium is the special radiolucency so permit the safe examination in MRI high field, useful for long term follow-up of the patients. Osseous defects of various sizes and forms can be solved by attaching autologous bone fragments fixed with titanium plates and screws. It also shows that titanium plates are also elastic and has resistance well calculated to allow easy intraoperative modeling, establish appropriate curvature of the head. There are several principles: the implant must be stable, resistant to daily activities and possibly minor injuries, to effectively protect the brain, not skid spontaneous, to be perfectly biocompatible, does not interfere with skin vasculature and not least to make an adequate cosmetic correction. Now there are a variety of biomaterials that meet these goals. Of all, the titanium is best suited for cranioplasty. Surgical procedure is relatively simple but requires a well set up infrastructure and obviously a degree of skill.

CONCLUSION:

Use of titanium mesh in the reconstruction of dural defect repair up to 2 cm is good option, thereby minimizing the recurrence, preventing morbidity and without postoperative side effect of extrusion, infection and displacement.

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