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ORIGINAL ARTICLE

Middle Cranial Fossa Approach for the Repair of Spontaneous Cerebrospinal Fluid Leaks to the Middle Ear☆

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KEYWORDS
Cerebrospinal fluid leak;
Spontaneous;
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Abstract
Introduction: Spontaneous cerebrospinal fluid (CSF) leaks to the middle ear due to tegmen tympani defects can result in hearing loss or hypoacusis and predispose to meningitis as well as other neurological complications. Surgical repair of the defect can be performed through a middle cranial fossa (MCF) approach or a transmastoid approach.
Material and methods: We conducted a retrospective study of the patients in our Department due to a spontaneous CSF leak to the middle ear treated using a MCF approach during a 6-year period (2009–2014).
Results: Thirteen patients with spontaneous CSF leak to the middle ear were treated with this approach. The primary and first symptom in all of them was conductive hearing loss. In all cases, the defect or defects were closed in a multilayer manner using muscle, temporalis fascia and cortical bone. Minimum follow-up in this series was 14 months, with successful closure in all but one patient (who required reintervention). We found no intra- or postoperative complications due to the craniotomy, and the audiometry improved and normalised in all cases except for the failed case.
Conclusions: The MCF approach with a multilayer closure of the defect is an effective technique for repairing spontaneous CSF leaks to the middle ear and for restoring hearing in these patients.

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PALABRAS CLAVE
Fístula líquido cefalorraquídeo;
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Abordaje por fosa media para el cierre de fístulas de líquido cefalorraquídeo espontáneas a oído medio

Resumen
Introducción: Las fístulas espontáneas de líquido cefalorraquídeo (LCR) al oído medio por dehiscencias espontáneas óseas del tegmen pueden ser origen de hipoacusia de transmisión y complicarse con meningitis u otras complicaciones intracraneales. El tratamiento quirúrgico para el cierre de estas comunicaciones anómalas puede realizarse por vía transmastoidea o por abordaje por fosa craneal media (FCM).
Material y métodos: Se realiza un estudio retrospectivo de los pacientes intervenidos en nuestro servicio de fístulas de LCR espontáneas a oído medio por medio de abordaje por FCM en un período de 6 años (2009-2014).
Resultados: Se intervienen 13 pacientes con fístulas espontáneas por este abordaje, siendo el síntoma de presentación de todos ellos la hipoacusia de transmisión. En todos los casos se realiza un cierre multicapa (músculo, fascia temporal y cortical ósea) para cerrar el defecto o defectos existentes. El seguimiento mínimo en todos ellos es de 14 meses, con cierre de la fístula en todos los casos salvo en uno, que precisó reintervención. No hubo complicaciones intraoperatorias ni postoperatorias debido a la técnica empleada, y la audiometría se normaliza en todos los casos, salvo en el caso de fracaso mencionado.
Conclusiones: El abordaje por FCM y cierre en multicapa es una técnica adecuada y eficaz para el cierre de fístulas de LCR espontáneas a oído medio y consigue, además del cierre de la comunicación, el re-establecimiento de la audición.

Introduction

Cerebrospinal fluid leaks (CSF) to the middle ear may be spontaneous or acquired. Those which are acquired may be due to several causes including trauma, chronic otitis media (with or without cholesteatoma), neoplasms, previous surgery, radiotherapy or infectious inflammatory diseases.[1,2] Less frequently these fistulas may spontaneously present.[3,4] In this second group of spontaneous fistulas there are 2 clearly differentiated subgroups: the first is presentation during childhood from congenital defects or congenital anomalies in the temporal bone and the second subgroup is presentation in middle or advanced age (generally from 50 years upwards).[2,4]

CSF leak fistulas in infancy are rare, and on many occasions the first symptom of presentation is meningitis in a child with a prior history of sensorineural hearing loss. In these cases imaging studies usually show up anomalies in the temporal bone of different types, such as a type 2 incomplete partition, perilymphatic fistulas on the oval window, defects in the most lateral region of the inner auditory canal, dilatations of the vestibular aqueduct, defects in Hyrtl's fissure or defects in the Fallopian tube.[3–7] The second subgroup, of adults with spontaneous CSF leak fistulas generally present as patients with fluid in the middle ear and conductive hearing loss, with no previous involvement of the middle ear. These patients usually present with one or several tegmen tympani or mastoid defects and less frequently with defects in the posterior fossa plane. It has been suggested that the cause of these bone defects which separate the intracranial cavity from the mastoid is congenital arachnoid granulations which increase in size due to repeated subarachnoid pressure over the years.[2,8] Physiopathology would consist in these arachnoid granulations not reaching the venous blood or translucence and would be mistakenly distributed around the middle fossa. Pulsatile pressure over the years may lead to bone erosion and should this erosion occur on a well pneumatised bone such as the temporal bone, a CSF leak fistula may form.[2,8] The defects lead mainly to cases of CSF leak to the middle ear or mastoids, and in several cases this may be accompanied by associated meningoencephalic herniations.[9–11]

For diagnosis of this pathology there should be high suspicion of cases of middle ear fluid or unilateral serous otitis media in patients with no previous background of tubal dysfunction or when there is no background of infectious or inflammatory processes in the middle ear. However, most of these cases are diagnosed on performing a myringotomy and leakage of CSF is therefore observed.[12,13] When this occurs diagnosis is completed by carrying out biochemical analysis of the liquid obtained (if possible) and imaging studies, which will be discussed below.

These anomalous communications between the intracranial cavity and the mastoid with CSF leakage to the middle ear or mastoids should be repaired to avoid possible serious life-threatening complications. Standard treatment for these fistulas has primarily been by trans-mastoid route, with variable outcome. However, there is growing consensus that it is preferable to treat these defects or fistulas by a middle cranial fossa approach (MCF).[9–11,14,15] This becomes more serious when there is more than one defect and when they are spread over the medial areas to the ossicular chain.