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## Remediable Recurrent Meningitis

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Recurrent attacks of meningitis is a rare event in childhood and is usually associated with a predisposing factor.

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Recurrent attacks of bacterial meningitis usually follow in the wake of cranial trauma(1). However, other important factors like sinusitis, mastoiditis, congenital dermal sinuses(2-5) and immunological causes related to humoral immunity and the complement system(6) are also important. Recurrent bouts of meningitis may also be seen with intracranial dermoids(7). The published reports on recurrent meningitis are mostly of single cases and a large series of recurrent meningitis is scarce. The present description of 11 cases of recurrent meningitis includes 5 cases of post traumatic intermittent CSF rhinorrhea, 5 children with congenital dermal sinuses and a case of intracranial dermoid, all presenting with recurrent episodes of meningitis.

### Case Reports

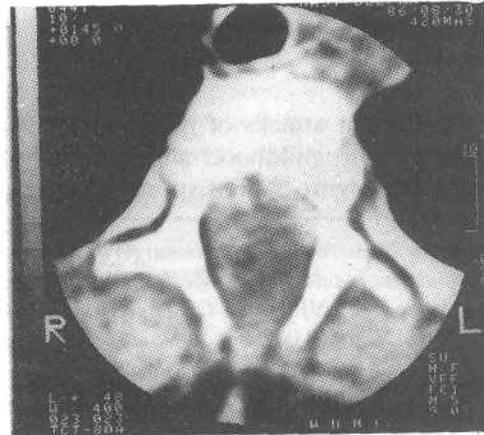
Elevent children under 14 years of

age with recurrent attacks of meningitis, surgically treated during the last 8 years were analyzed. Recurrent meningitis with intermittent CSF rhinorrhea occurring after a variable interval following head injury was observed in 5 children. The number of bouts of meningitis varied from 2-12 prior to surgery. These patients, prior to referral to G.B. Pant Hospital were treated at various medical centres some without CSF culture facilities and hence in these cases no definite conclusion could be obtained as regards the causative organism. The diagnosis of pyogenic meningitis was based on a polymorphonuclear response in the blood and CSF with decreased sugar during an episode of fever with meningeal signs. Prior to admission with us these patients had received various combinations of antibiotics to which they had shown a complete response as evident by an acellular CSF and absent meningeal signs. Computerized tomography (CT) of brain after institution of water soluble contrast medium in CSF demonstrated the site of leak in all these cases. Craniotomy and repair led to definitive cure and all children are clinically well on follow up.

Of the 5 patients with congenital dermal sinuses, 3 had the sinus in the thoracic region, 1 in occipital region and 1 in sacral region. Among the 3 cases of dorsal dermal sinuses, the first child had recurrent episodes of meningitis and features of raised intracranial tension masquerading as post meningitic hydrocephalus. The presence of dermal sinus was missed by the referring clinician. CT scan revealed intramedullary epidermoid with hydrocephalus (*Fig. 1*). The other patient with dorsal dermal

sinus had meningitis with spina bifida occulta with tethered cord. The third child with dorsal dermal sinus was initially diagnosed as spinal poliomyelitis owing to the presence of fever and paraplegia. The importance of two previous episodes of meningitis was inadvertently overlooked. CT scan revealed hydrocephalus and patient was referred for management of post meningitic hydrocephalus. A careful clinical examination revealed a sinus tract which was excised with the underlying dermoid. Following surgery a complete neurological recovery was attained. The patient with sub occipital dermal sinus had a right cerebellar abscess in addition to a midline posterior fossa dermoid. An intramedullary dermoid was demonstrated in the child with pilonidal sinus. The patient with Klippel Fiel anomaly with raised intracranial tension had a dermoid in the cerebellar vermis and left cerebellar abscess in addition to obstructive hydrocephalus (*Fig. 2*).

All the 11 children operated are clinically well till date with no residual neurological sequelae.



*Fig. 1. Intramedullary epidermoid with dermal sinus.*

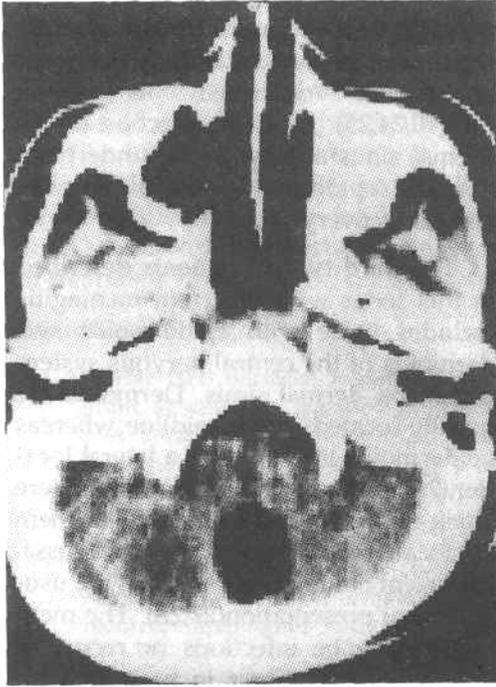


Fig. 2. Dermoid cyst with abscess left cerebellum.

### Discussion

Recurrent meningitis in childhood is extremely rare. It is seen in immunocompromized hosts, in patients with anatomic defects (congenital or acquired) or as a complication of parameningeal focus(8). The causative organisms are generally those of the upper respiratory tract or skin: *Strep. pneumoniae*, *H. influenzae* and *Staph. aureus*. Only a few cases of streptococcal(9) and staphylococcal(10) recurrent meningitis associated with dermal sinus tracts have been reported.

Among all the causes, traumatic events leading to recurrent meningitis is the commonest. About 80% of cases of CSF rhinorrhea occur following head in-

jury, 16% follow surgery and 4% are spontaneous(11). CSF rhinorrhea occurs in 11% of skull base fractures(12) usually within 48 hours of trauma(13); most patients presenting within one week. Among the largest series of children with head injury, only 0.26% were identified with CSF rhinorrhea as compared to 2-5% of head injuries in adults(14,15). Park *et al.* also documented the rarity of this problem in children especially in the very young(15). The vast majority (70%) of traumatic fistulae present within one week of injury; however, some fistulae will be delayed in onset by weeks to months(13).

Confirmation that the fluid leaking is CSF has traditionally been made on its glucose content but the most specific test is the identification by immunofixation of beta-2 transferrin found only in CSF(16).

Bacterial meningitis is the major complication occurring in 25-50% of untreated fistulae(12,13); in 10% of cases within the first week after trauma and in 10% of cases following spontaneous cessation of leakage(11). Meningitis is the most frequent severe complication of a dermal fistula with *S. pneumoniae* being the usual pathogen(14,16,17). In a description of CSF fistulae in children by Jones *et al.*(18) 4 patients contracted meningitis out of a total of 27. In another study, recurrent meningitis occurred in only two children out of 7 with CSF rhinorrhea(19). Accurate localization of the site of cerebrospinal fluid leakage is essential for effective surgical repair. CT cisternography using non ionic contrast media is currently the most reliable technique.

Most authors agree that barring

other factors and injuries, the mainstay of treatment of CSF leaks should be conservative therapy(15). This should consist of bed rest, elevation of the head of the bed, avoidance of straining and use of stool softeners. Seventy per cent of patients respond with leak closure using this treatment protocol. Repairing CSF leaks in children is not advocated until 3 weeks of conservative management have passed although it is difficult. Currently, the indications for direct operative management of CSF fistulae include: (i) failure of conservative management, (ii) missile trauma with CSF leak, (iii) meningitis in the presence of CSF leak; and (iv) delayed onset of and intermittent CSF leaks.

Patients with congenital dermal sinus tracts comprise the other important group of recurrent meningitis. Congenital dermal sinuses are rare manifestations within the spectrum of spinal dysraphism, their incidence being 1 in 2500 live births(20). A hyperpigmented patch, hairy nevus or capillary angioma is usually present at the skin surface. Pilonidal sinuses are more common in the sacral region whereas they are uncommon in the cranial area and very rare in the cervical and thoracic regional). Approximately half of all dermal sinuses have associated dermoid or epidermoid cysts(22) usually at the termination of the tract. The diagnosis is clinical and confirmation is radiological. On physical examination, the patients present a dimple usually small and midline that may or may not discharge cerebrospinal fluid. Infection of the dimple and recurrent meningitis are not uncommon<sup>^</sup>). The reasons for meningitis may be either infection or chemical irritation of the meninges by cholesterol

crystal released from the intraspinal dermoid or epidermoid. Recurrent meningitis due to congenital dermal sinuses has been described in literature(10,24,25). Surgical resection of the dermal sinus alongwith the underlying dermoid/epidermoid lead to complete clinical recovery.

The third type of patients described in this series with recurrent meningitis includes those with epidermoids and dermoids of the central nervous system without a dermal sinus. Dermoids are usually located in the midline whereas epidermoids tend to have a lateral location(26). Their location can be anywhere along the neural tube but most of them are located at the posterior cranial fossa. Recurrent bouts of meningitis is the usual clinical presentation(27,28). The meningitis may be infectious or recurrent meningitis may occur in patients with dermoids or epidermoids without sinus tract as a result of spontaneous discharge of the cyst into the CSF causing a sterile chemical meningitis(27,28). This explains the sterile meningitis in our case in which a dermal sinus was not present. Surgical resection of the mass led to complete cure with ablation of further bouts of meningitis.

Our observations confirm that recurrent meningitis is invariably associated with a predisposing factor. When meningitis occurs in the same subject, the usual investigations (objective examination, hematochemical tests, lumbar puncture) are insufficient. It is also advisable to carry out a detailed examination of ear, nose and throat for possible sinusitis and mastoiditis, a thorough examination of the skin (after shaving of head if need be) for congenital dermal

sinuses, a complete immunological evaluation and metrizamide CT scan to check for fistulous connection between nasal sinuses and subarachnoid space. The use of radiological investigation especially computed tomography and MRI to detect intracranial lesions like dermoid, should be taken into consideration to establish the most suitable form of treatment.

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## Macromastia in Adolescent Girls

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Macromastia has been defined as enlargement of the breast at which 50% of normal women experience discomfort

from the weight of their breasts, which usually occurs when the breast weight exceeds 600 g(1). To differentiate macromastia from moderate to minimal breast enlargement, diagnostic criteria have included in addition, the overlying

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