Discuss the use of intrathecal fluorescein, include risks, effectiveness in locating leak.


4.2.2 List etiologies of CSF rhinorrhea. CC

4.2.3 List etiologies of CSF otorrhea. CC

4.2.4 What laboratory tests can determine if fluid is CSF? SW

4.2.5 Describe radiologic tests that can localize a CSF leak. SW

Would you use antibiotics in a patient with a CSF leak? AL
The role of prophylactic antibiotics remains controversial. Some data suggest that antibiotics should be administered after detection of a cerebrospinal fluid leak, but the data are far from conclusive. Certainly, in the presence of active infection adjacent to the leak site, antibiotics are prudent.

Complications of lumbar drainage are significant, so this technique should be used cautiously.59 In the scenario of markedly elevated ICP, it should be avoided. In addition, lumbar drainage carries a risk of meningitis. Despite that risk, routine antibiotic therapy for prophylaxis of meningitis is not warranted, because it is probably ineffective and may even induce resistance in likely pathogens.17,60 Nonetheless, a first-generation cephalosporin (or similar agent) for coverage of skin flora may minimize the risk of cellulitis at the puncture site with secondary ascending meningitis. In addition, it is reasonable to administer antibiotics in those patients with a history of suppurative bacterial rhinosinusitis.

Bacterial meningitis is the major cause of mortality and morbidity in patients with CSF fistulas. Considering the contaminated surgical field during the endoscopic repair of CSF fistulae, most surgeons elect to use perioperative antibiotics. Typically an agent with good CSF penetration, such as ceftriaxone, is administered. The efficacy of longterm prophylactic antibiotics for the prevention of meningitis in patients with active CSF rhinorrhea, however, remains a very controversial issue. The primary concern about unwarranted use of antibiotics is the potential for selection of resistant organisms. The reported incidence of meningitis in patients with posttraumatic CSF fistulas varies greatly (2% to 50%).71-73 Multiple factors, including the duration of CSF leakage, delayed onset of CSF leakage, site of the fistula, and concomitant infections, seem to affect the occurrence of meningitis. Patients with posttraumatic CSF leaks lasting more than 7 days have at least 8- to 10-fold increase in risk of meningitis.71,72 Strong consideration should therefore be given for surgical repair of posttraumatic CSF leaks persisting more than 7 days despite appropriate conservative management.
MacGee and associates\textsuperscript{74} reported one of the main studies frequently cited in arguments against the use of prophylactic antibiotics in posttraumatic CSF fistulas. They described a series of 58 patients and reviewed data on 344 patients from the literature, for a total of 402 patients with posttraumatic CSF leaks. There was a 14\% incidence of meningitis in the group who received prophylactic antibiotics, compared with 5\% in the group treated without antibiotics. However, the difference in incidence of meningitis between the two groups did not reach statistical significance. In a meta-analysis of six studies involving 324 patients with posttraumatic CSF leaks, Brodie\textsuperscript{73} found a 2.5\% incidence of meningitis in patients who received prophylactic antibiotics and a 10\% incidence in those who did not receive antibiotics. The difference was statistically significant ($P = .006$). Individually, however, none of the studies included in this analysis demonstrated a significant difference in incidence of meningitis with prophylactic antibiotic therapy. It is important to mention that there is a paucity of studies examining the incidence of meningitis in nontraumatic, idiopathic CSF leaks.

For patients with persistent leaks, immunization against Streptococcus pneumoniae, Haemophilus influenzae, and Neisseria meningitidis may be considered.

Discuss the medical management of CSF leaks. AL

**Conservative Treatment**

Conservative treatment of CSF rhinorrhea includes a 1- to 2-week period of strict bed rest with head elevation as well as several days of continuous subarachnoid drainage through a lumbar catheter (or intermittent drainage through serial spinal taps) (Box 54-2). In addition, patients are advised to avoid coughing, sneezing, nose blowing, and measures is to reduce the CSF leak flow by decompressing the ICP; in this way, healing at the defect site may seal the leak without surgical intervention.

Although lumbar drains are passive devices, they require active management. CSF specimens for cell count, protein and glucose measurements, and culture should be collected daily. An hourly drainage rate of 10 mL is desirable. Of course, higher rates produce a greater decompression of ICP; however, higher rates may lead to abnormally low ICP, which can produce severe headache. Low ICP also may cause pneumocephalus as air is drawn through the skull base defect. If low ICP is suspected, the rate of drainage should be decreased or the drain should be clamped until the ICP equilibrates at a higher level.

A patient presents with spontaneous CSF rhinorrhea. On nasal endoscopy you notice a soft tissue mass medial to the middle turbinate. How would work up this patient? What is the differential diagnosis? TT

Describe an endoscopic repair of an anterior skull base defect/CSF leak. What grafting and packing materials would you use? CB
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<tr>
<th>Question</th>
<th>Response</th>
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<tr>
<td>4.2.10</td>
<td>How would you approach a CSF leak secondary to a defect in the lateral sphenoid sinus? CB</td>
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| 4.2.11   | What is the efficacy of endoscopic repair of CSF leak?  