Repair of cerebrospinal fluid fistula following transoral transclival approach to a basilar aneurysm

Technical note

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A technique for closure of a cerebrospinal fluid fistula following a transoral transclival approach to a basilar aneurysm is described. Transposition of a rotation flap of the mucosa of the septum and the floor in the choana resulted in complete closure of the thin and fragile nasopharynx without tension at the suture site.

KEY WORDS • basilar aneurysm • transclival approach • transoral approach • clivus • cerebrospinal fluid fistula

The successful obliteration of ruptured verteobasilar aneurysms is reported with increasing frequency. However, surgery for aneurysms arising at the middle or lower third of the basilar artery have posed considerable difficulty. In 1966, Sano, et al., reported the first successful case of transoral transclival approach to an aneurysm located at this “no man’s land.” They stressed the advantage of this route in permitting dissection of the aneurysm under direct vision without any retraction of the brain or the cranial nerves. In spite of their success, subsequently reported cases have been few, and more than half of such cases were complicated by cerebrospinal fluid (CSF) fistula and consequent meningitis. The postoperative CSF leakage and persistent fistula were mainly due to difficulty in closure of the thin and fragile nasopharyngeal mucosa over the bone opening through the clivus.

Recently we have used the technique of transposing a rotation flap of the mucosa of the posterior nasal septum and floor to successfully repair a CSF fistula of the nasopharynx, which had resisted multiple procedures for a period of 11 months following the primary surgery for a ruptured aneurysm of the middle of the basilar artery. This technique seemed to take care of this risky complication of transoral transclival approach, and would be useful in surgery for neoplastic disease of the clivus.

Operative Technique

Transoral transclival approach to an aneurysm at the middle third of the basilar artery was performed by a technique similar to that reported by Sano, et al., The posterior half of the hard palate and the nasal septum were removed, and a midline incision was placed on the soft palate. The naso- and oropharynx were incised at the midline, and the underlying pharyngobasilar fascia was cut with a cautery. A window, 1.5 x 2.0 cm in size, was made in the clivus by high-speed air drill. The aneurysm was successfully managed, and the dural and clival defect was repaired by Biobond-soaked Oxycel, and pieces of fascia lata. The pharyngeal constrictor muscle, which would normally supply reliable supportive tissue for closure, was absent in the upper portion of the pharynx, and it was difficult to place sutures in the pharyngobasilar fascia because of shrinkage by cautery. Because the pharyngeal mucosa in its nasal portion contains a considerable amount of lymphoid tissue, primary closure was unsatisfactory and a persistent CSF leak resulted.

For 11 months after the primary surgery, this small fistula resisted multiple procedures, including con-
CSF fistula complicating transoral-clival surgery

Fig. 1. Repair of CSF fistula at the nasopharynx. A rotation flap was made of the mucosa of the posterior nasal septum and floor at the choana, on the patient's right side. Then this flap was moved to the nasopharynx, resulting in a complete and tension-free closure of the mucosa.

tinous spinal drainage and transnasal tran
sphenoidal repair of the nasopharynx. Finally, the primary wound was reopened, and the posterior nasal mucosa at the medial and inferior aspect of the choana, that is, at the septum and the floor of the posterior nasal cavity, was incised to create a rotation flap (Fig. 1). This flap was transferred to the site of the fistula at the nasopharynx. Mucosal closure was completed without any tension to the suture site. A light compression dressing was kept on this flap for several days. Wound healing was satisfactory without recurrence of the CSF leak.

Discussion

The transoral transclival route to an aneurysm located in this “no man’s land” seems to be the most logical approach from an anatomical point of view, compared with the intracranial approaches of the sub-temporal transtentorial and suboccipital route, or the transcervical transclival route. The disadvantage of this technique is the risk of postoperative infection. The operative field in the oral and pharyngeal cavities would be the primary source of contamination. This could be controlled by antibiotics. In our experience of transoral anterior fusion of a C1-2 lateral mass in odontoid fractures, there has been no infection so long as the dura mater was intact, and reports of infection are rare. The true hazard is meningitis caused by a CSF fistula through a dural and clival defect due to incompetent closure of the overlying nasopharyngeal mucosa. The upper portion of the pharynx lacks the elastic constrictor muscle, and the pharyngobasilar fascia, which is the rostral continuance of the constrictor muscle, is shrunk by use of the cautery, leaving a large gap, and the mucosa is thin and very fragile because of lymphoid tissue.

Drake described the use of a large pharyngeal flap over the lower third of the clivus and the anterior arch of the axis in direct surgery on a vertebral aneurysm. He did not mention vascular supply to the tip of such a large flap and difficulty in suturing nasopharyngeal mucosa at the level of adenoid tissue. We question the need for such a large flap, extending to the lower clivus and the upper cervical portion with the thick constrictor muscle. In our technique, the upper portion of the pharyngeal mucosa, where the constrictor muscle is absent and there is difficulty in closure, was reinforced by a rotation flap of the posterior nasal mucosa, providing relaxation of the suture site for good wound healing. More cases should be accumulated before comparing the superiority of either method.
It is our belief that if such a rotation flap is used routinely, the transoral transclival approach would become a much safer procedure. Also, this technique would be useful for surgery of neoplasms of the clivus.

References
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