Novel transphenoidal implant plus acellular dermis gasket seal closure in patients undergoing transphenoidal resection of sellar lesions

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Abstract

Introduction: CSF leak following transphenoidal resection of pituitary adenomas is an uncommon but potentially life-threatening post-operative complication. We report a novel technique for decreasing the risk of postoperative CSF leak.

Methods: We performed a retrospective review of patients undergoing transphenoidal resection of a pituitary lesion by the senior neurosurgeon (A.H.K.) from 2011-2016 (N= 86, 35 male, 61 female). We excluded any patients who had a pituitary lesion that was surgically resected via craniotomy and patients who did not receive acellular dermis (AlloDerm) in their closure. In patients with noticeable intrathecal cisternal or third ventricular CSF leak or with bowing of the diaphragma inferiorly, we placed a generous acellular dermis onlay over the bony defect followed by a Medpor transphenoidal implant (Figure 1) anchored in the epidural or subdural space to generate a gasket seal (Figure 2). Additional surgical adjuncts including lumbar drain and nasosseal flap were also noted for each case. Lumbar drains were placed prophylactically for lesions with suprasellar extension that abut the optic chiasm.

Results: Overall, there was a total intra-operative CSF leak rate of 37.2% (32 of 86) and a post-operative CSF leak rate of 5.8% (5 of 86). 80% of the post-operative CSF leaks (4/5) had an intraoperative leak and 40% (2/5) were craniohypophysiorrhages. Of the patients who were closed with both acellular dermis and a Medpor TSI gasket seal, the leak rate was 2.7% (1 of 36) Of the remaining CSF leak cases, three were closed with a nasosepal flap with acellular dermis and no gasket, and one was closed with acellular dermis only, 52.3% (45 of 86) of patients had a lumbar drain placed preoperatively.

Conclusions: Overall, utilization of a combined acellular dermis and transphenoidal implant gasket seal offers a safe and effective technique for reducing the incidence of post-operative CSF leaks in patients undergoing transphenoidal resection of pituitary lesions.

Introduction

- CSF leak following transphenoidal resection of pituitary adenomas is an uncommon but potentially life-threatening post-operative complication.
- Intraoperative CSF leak is common with a reported incidence of 11 to 54%.
- Post-Operative CSF leak rate after endoscopic endonasal transphenoidal resection ranges from 0.1 to 9%.
- Various methods for reducing CSF leak have been proposed, all of which include multilayer closure involving autologous and synthetic materials.
  - Synthetic: gelatin foams, collagen sponges, collagen fleece, collagen foil, AlloDerm, polyester silicone, polyglycolic acid sheets, polylactidefluorothylene, silicone plates, pericardial bovine xenograft, Vicryl patch, oxidized cellulose, fibrin glue, BioGlue, DuraSeal, titanium mesh and plates, absorbable plates, and inflated balloons, aluminna ceramic, silicone, titanium, stainless steel.
  - Autologous: free and vascularized mucosal flaps, bone, cartilage, fat, autologous fascia, muscle, rectus sheath.
  - Current gold standard: fat autograft or nasosepal flap (generally for larger leaks).
- However, these methods do have risks.
  - Autologous fat graft: Fat necrosis, hematoma, wound dehiscence, pain, abdominal infection, abdominal scar (cosmetic).
  - Nasal septal flap: Crusting, cartilage necrosis, septal perforation, increased operative time, pain.

Methods and Materials

- Retrospective review of patients undergoing endonasal, endoscopic, transphenoidal resection of a sellar/suprasellar lesion by the senior neurosurgeon (A.H.K.) from 2011-2016.
- N=87 (36 M, 45 F).
- Exclusion criteria:
  - No use of acellular dermis onlay in closure.
  - Surgical resection via craniotomy.
  - Lumbar drains were placed prophylactically for lesions with suprasellar extension abutting the optic chiasm.

Results

- Total intra-operative and post-operative CSF leak rate of 37.2%.
- Total post-operative CSF leak rate of 5.8%.
- However, when separated into groups of AlloDerm only compared to AlloDerm + TSI, we found that the post-operative CSF leak rate in the AlloDerm group was 8% compared to a post-operative CSF leak rate of 2.7% in the AlloDerm + TSI group (Table 1).
- While the overall postoperative CSF leak rate was lower in the AlloDerm + TSI group, there was a higher intraoperative CSF leak rate (56.7%) compared to the AlloDerm group (24%). All postoperative leaks in our study had preoperative lumbar drains placed.

Discussion

- 40% (2/5) of patients with post-operative CSF leak were found to have craniohypophysiorrhages.
- 80% of the post-operative CSF leaks (4/5) had an intraoperative leak.
- In the one patient that had a post-op leak with AlloDerm/gasket seal, the construct was found to be grossly malpositioned likely secondary to patient coughing.
- Of the remaining CSF leak cases, three were closed with acellular dermis followed by a nasosepal flap and no gasket, and one was closed with acellular dermis only.

Conclusions

Overall, utilization of a combined acellular dermis and transphenoidal implant gasket seal offers a safe and effective technique for reducing the incidence of post-operative CSF leaks in patients undergoing transphenoidal resection of pituitary lesions.

References


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Figure 1. Medpor TSI (large size).

Figure 2. Gasket seal with AlloDerm and TSI.