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Case Report

Exceptional Use of Jackson-Pratt Drain for Preventing Stenosis in Endoscopic Sinus Surgery

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Abstract

Background: Endoscopic Sinus Surgery (ESS) failures are often due to the physiological deposition of fibrotic tissue determining post-surgical scars, stenosis and re-obliteration of sinuses ostia, especially at the level of the fronto-etmoidal sinusotomy and middle meatus. Many efforts have been directed to prevent it, with rarely satisfying results. The Jackson-Pratt (JP) is a suction catheter that limits body fluid collection near the site of surgery and thanks to its softness and elasticity can be used in different clinical and surgical practices. In this article, we show two possible exceptional uses of the JP drain in endoscopic sinus surgery to avoid immediate post-surgical scarring obliterations.

Methods: During ESS, a modified JP drain was inserted into the frontal recess (FR) and middle meatus (MM) of two different patients and removed one month after surgery. Booth patients were re-assessed by nasal endoscopy 4 months after the procedure. We present text and pictures to illustrate this technique for educational purposes.

Results: The optimal length of JP about 6 cm for frontal sinusotomy 4 cm for middle meatus. The duration of surgery is not affected by the positioning of the drain, and no complications have occurred. At 4 months follow-up, surgical sinusotomy were still wide open and correctly draining. Also, no scaring synechiae between the lateral wall and middle turbinate were observed. Finally, costs (about 2$) resulted reasonably low.

Conclusion: JP positioning in FR and MM appears to be a safe, feasible and convenient domestic solution to prevent short-term ESS failure due to scarring or inflammatory restenosis. Longer follow-up and randomized clinical trials with larger cohorts will allow the assessment of its safety and cost-effectiveness.

Keywords: Nose and Paranasal Sinuses; Frontal Sinus; Jackson-Pratt Drain; Endoscopic Sinus Surgery; Nasofrontal Recess; Rhinosinusitis.

Introduction

Endoscopic sinus surgery (ESS) is gold standard in the surgical management of both acute and chronic inflammatory disease of paranasal sinuses. Its initial success rate in symptoms relief is high, however, surgery-free survival and long-term revision rates varies depending on series. A recent prospective study on a cohort of patients with severe Th2-driven chronic rhinosinusitis with nasal polyposis (CRSwNP) revealed that up to 95% experienced recurrence within 5 years from surgery, regardless of the extensiveness of the mucosa-sparing technique undertaken [1]. Stein et al. analyzed the largest dataset in literature, of 61,339 patients from the State Ambulatory Surgery and Services Database (SASD) of California, reporting a revision rate of 6.65% in CRS, with a higher frequency in cases of CRSwNP [2]. In cases of immediate failure, one of the most common causes is represented by post-surgical scars and consequent stenosis of sinuses ostia, occurring especially at the level of the fronto-etmoidal sinusotomy and middle meatus (MM). The deposition of fibrotic tissue, formation of synechiae and nasal adhesions are often responsible for inflammatory re-obliteration of the sinusotomy, often leading to a clinical relapse that is hard to control [3]. For this reason, efforts have been directed towards developing extended techniques and devices (e.g., stents) that could lower the risk of short-term unwanted scarring and ostia obliterations. In this article we show the exceptional uses of Jackson-PrattTM (JP) silicone drain in ESS, providing text and pictures as a multimedia tool for educational purpose.

Methods

The JP is a suction catheter that is commonly used in clinical practice to prevent bodily fluids from collecting at the site of surgery. It was originally developed for a neurosurgical intracranial purpose, but it has been applied throughout the entire body in a variety of surgical procedures [4]. It may present in various lengths and diameters, yet the most used (especially in Gastrointestinal, Breast, Thoracic and Head and Neck surgeries) is usually a 1 cm wide and 20 cm long fenestrated flat drain, connected to a 60 cm long conduction tube (Figure 1). The drain area is made of a silicon elastomer that ensures softness and flexibility so that it can be shaped as needed, with internal ridges preventing collapse. We hereby present the technique of insertion of a modified JP drain in the frontal sinusotomy and in the MM of two patients undergoing ESS. The study follows the principles of the Declaration of Helsinki; the patients enrolled signed informed consent.

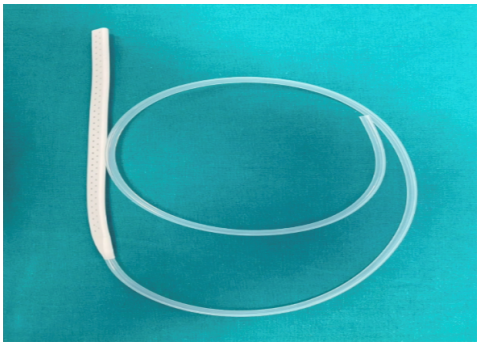

Figure 1: Jackson-Pratt™ silicone drain.

Results

The first case is a 27-year-old female affected by type-2 CRS without nasal polyps, with comorbid allergic polysensitization and asthma. At endoscopic examination mucosal oedema was observed; computed tomography (CT) revealed a pansinusitic pattern (Lund-Mackay score: 16/24). She had never received surgery before, hence a full functional ESS (full-FESS) was indicated. A bilateral Draf IIb procedure was performed with a wide opening of both frontal sinuses and preservation of anterior ethmoidal arteries (Figure 2). At the end of the procedure, a 6-cm long JP catheter was inserted bilaterally into the frontal ostia, with its lower extremity at the level of the axilla of the middle turbinate (MT); in order to prevent displacement, the cranial extremity was "flute-beak" shaped (Figure 3). The procedure was rapidly performed with a Weil-Blakesley nasal forceps; no complications were reported afterwards. The stents were removed one month after the procedure was completed. At 4 months follow up examination, frontal sinusotomies were still wide open. Despite the high inflammatory load of the patient, neither scarring obliterations nor mucosal oedema were observed (Figure 4).

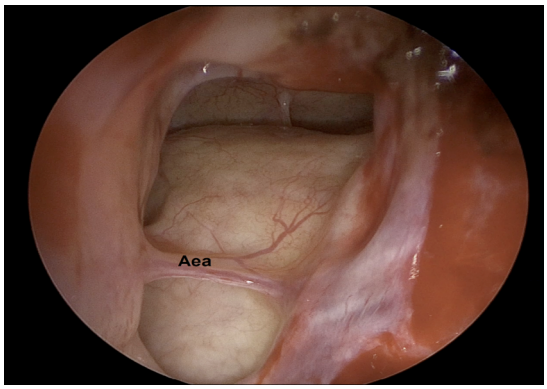

Figure 2: Left frontal sinusotomy. The middle turbinate attachment into the floor of the frontal sinus has been removed (Draf IIb). Aea = anterior ethmoidal artery.

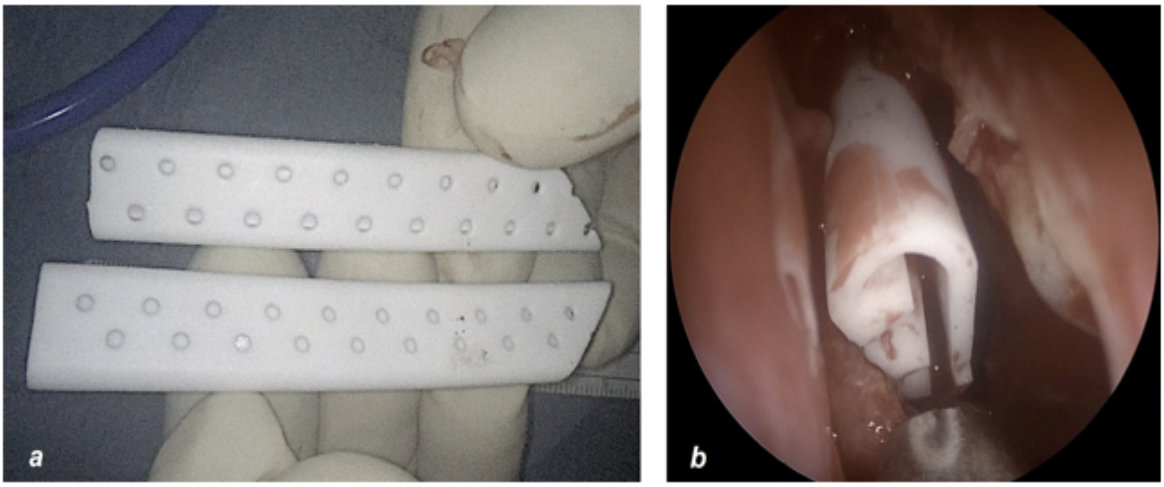

Figure 3: Six-centimeters long "flute-beak" shaped JP catheter (a). Correct positioning in left frontal sinusotomy (b).

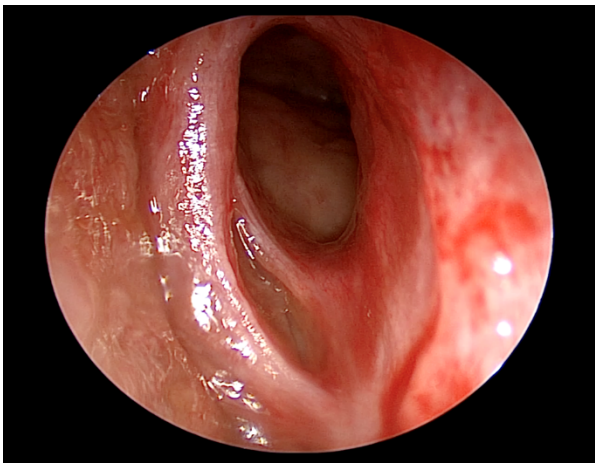

Figure 4: Left frontal sinusotomy at 4 weeks follow up examination.

The second case is a 39-year-old female suffering from recurrent acute rhinosinusitis. At endoscopic examination oedema of ethmoidal mucosa with blockage of ostiomeatal complex and septal deviation were observed. The CT scan showed bilateral dysventilated sinuses (Lund-Mackay score: 4/24), with ethmoidal mucosal thickening, complex cellularity of the ethmoid and concha bullosa. A full-FESS with septoplasty was performed. At the end of the procedure, a 3-cm long JP catheter was placed in the MM to prevent the lateral collapse of the MT, that would increase the risk of obstructing the maxillary and frontal outflow, especially after the use of silicone septal splints to stabilize the septum and avoid nasal packing (Figure 5). No complications such as pain, displacement or infection occurred. Even in this case, the catheter was removed one month after surgery. At 4 months clinical examination, no scarring synechiae between the lateral wall and MT, which stayed on its right axis, were formed; surgical sinusotomies remained wide open and correctly draining.

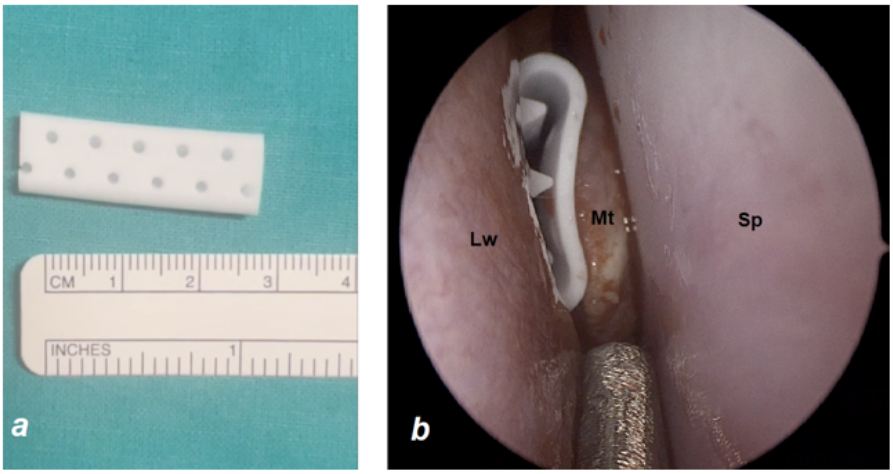

Figure 5: Three-centimeters long JP catheter (a). Correct positioning in right MM after full FESS and septoplasty (b). Sp = silicone septal splint; Mt = Middle turbinate; Lw = Lateral wall.

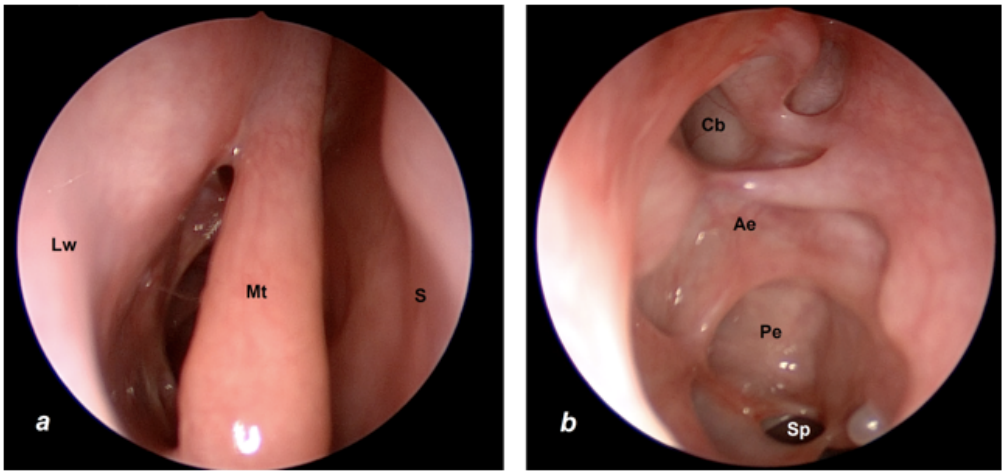

Figure 6: Endoscopic examination at 4 weeks examination. Neither synechiae nor oedema is visible in right MM (a) or at the level of surgical sinusotomies (b). Mt = Middle turbinate; Lw = Lateral wall; S = septum; Cb = cranial base; Ae = anterior ethmoid; Pe = posterior ethmoid; Sp = sphenoid.

Discussion

Over the years, endoscopic sinus surgery has gradually increased its effectiveness in the treatment of rhinosinusal inflammatory diseases. However, despite operative instruments improvement and surgical technique refinement, complications such as ostia re-stenosis and impaired sinus drainage in both the short and long term [5]. In this article, we proposed two exceptional and simple applications of the JP drain to stent the fronto-ethmoidal recess and the middle meatus, lowering the chance of their restenosis with minimum risks. The placement in the frontal recess and MM requires tailoring of the drain. In spite measures are subjective and should be patient-tailored, the approximate length is of about 6 cm for the former and 4 cm for the latter. The duration of surgery is not affected by the positioning of the drain, and no complications (e.g., pain, infection, displacement) were experienced. The possibility of displacement is reasonably followed, at most, by the JP extrusion from the nostrils without risk of accidental ingestion. Furthermore, compared to other silicone stents routinely used in paranasal sinus surgery, Jackson-Pratt drain price is extremely low (i.e., about $2 each).

Conclusions

JP positioning in middle meatus and frontal recess is a safe, feasible and convenient domestic solution to prevent short-term ESS failure due to scarring or inflammatory restenosis. Longer follow-up and randomized trials with larger cohorts would allow the assessment of its safety and cost-effectiveness.

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