Section A -Research paper

Posterior Nasal Nerve Neurectomy for Treatment of Rhinorrhea

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Abstract:

Rhinitis affects up to 40% of the population worldwide and can significantly reduce quality of life. Some patients remain symptomatic despite maximal medical therapy. In refractory cases, posterior nasal neurectomy (PNN—the endoscopic division of the intranasal nerve branches containing postganglionic parasympathetic fibres) is postulated to reduce symptom burden.

Keywords: Posterior Nasal Nerve Neurectomy, Rhinitis.

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Introduction:

Posterior nasal nerve (PNN) is a peripheral branch of the sphenopalatine ganglion. It enters the nasal cavity through sphenopalatine foramen. The posterior superior nasal nerves innervate the superior and middle turbinates, and the superior and middle meatus **(1).**

Other parasympathetic nerve fibres of the nose branches off and joins the greater palatine nerve and enters the nasal cavity through the canaliculi in the perpendicular plate of the palatine bone as the posterior inferior nasal nerves. These nerves innervate the inferior turbinate and the inferior meatus**(1).**

Secretory motor fiber exits the sphenopalatine foramen in multiple branches, each of which is directed to a different target (eg, lacrimal gland and nasal mucosa). The branch originating from the pterygopalatine ganglion (PPG) is found to specifically innervate the nasal mucosa and has been called the posterior nasal nerve.**(1).**

The posterior nasal nerve, which is a peripheral branch of the vidian nerve, comprises parasympathetic and sympathetic vidian nerve fibers and sensory nerve fibers from the trigeminal nerve. PNN, which is a highly selective type of neurectomy, and vidian neurectomy (VN) are both expected to suppress nasal hypersecretion by blocking autonomic vidian nerve fibers as well as

hypersensitivity by simultaneously blocking sensory nerve fibers .**(2)**

Approach for posterior nasal neurectomy :

Incision:

A crescent-shaped incision was made from the middle and inferior turbinate's posterior ends. The created flap was elevated to reveal the sphenopalatine artery (SPA), crista ethmoidalis (CE), and PNN.**(3)**

Fig.1: Left side nasal cavity: incision site.quoted from Ahilasamy, N. and K.R. Dinesh, Endoscopic posterior nasal neurectomy. The Journal of Laryngology & Otology, 2019. **133**(9): p. 825-829. **(4)**

Posterior nasal nerve identification:

As middle meatal antrostomy has been performed, the mucoperiosteum flap is elevated from the posterior edge of the MMA. Care must be taken not to injure the sphenopalatine vessel during flap elevation. The peripheral part of the posterior nasal nerve can usually be identified just behind the incision, about 4–5 mm inferior to the sphenopalatine artery or crista ethmoidalis (Figure 2). **(4)**

Fig. 2: Left side nasal cavity: flap elevated, with posterior nasal nerve identified.quoted from Ahilasamy, N. and K.R. Dinesh, Endoscopic posterior nasal neurectomy. The Journal of Laryngology & Otology, 2019. **133**(9): p. 825-829.**(4)**

Eren, E., et al. also reported that the posterior nasal nerve is usually seen on the anterior plane of the artery at the sphenopalatine foramen. The proximal portion or the main trunk of the nerve lies anterior to the sphenopalatine artery at the sphenopalatine foramen level. The nerve is carefully delineated and cauterized using a bipolar cautery and it is resected with micro scissors.

The nerve is resected at its main trunk, in order to avoid missing of its peripheral branches.**(5)**

It is always better to identify the main trunk or the proximal part of the posterior nasal nerve below the sphenopalatine foramen area, where the nerve lies inferior to the vessel. The nerve may divide into several branches at its exit into the nasal cavity, each through its foramen. After identifying the nerve fibres, it is cauterised using monopolar suction cautery or cut

using microscissors. then the mucoperiosteal flaps are repositioned .**(4)**

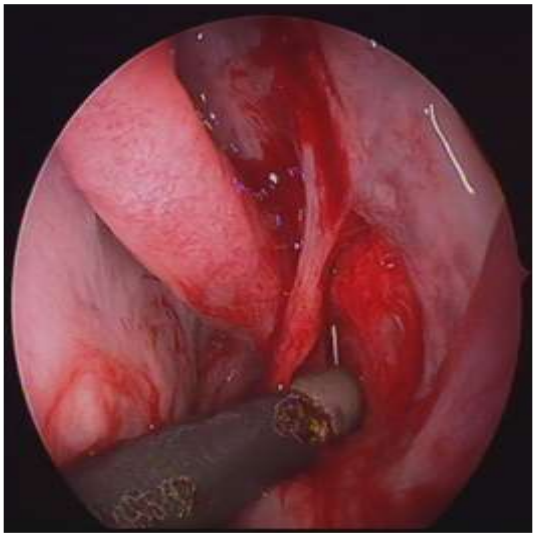

Fig. 3: Left side nasal cavity: suction cautery of posterior nasal nerve quoted from Ahilasamy, N. and K.R. Dinesh, Endoscopic posterior nasal neurectomy. The Journal of Laryngology & Otology, 2019. **133**(9): p. 825-829.**(4)**

Moreover, PNN resection has been performed through several methods. The meticulous dissection of the SPA allows the identification of the nerve, which is found mostly posterior and inferior to the artery, usually while sparing the artery. **(6)**

A different, recently developed approach is targeting the lateral nasal wall without any dissection. This can be achieved with a cryotherapy device (applied endoscopically to the posterior middle meatus) used to freeze the PNN region bilaterally. Without precise identification of the nerve, cryotherapy can be done in the office, and a follow-up with patients has shown a reduction in rhinorrhea and congestion for many months. **(6)**

Value of posterior nasal neurectomy :

The posterior nasal nerve is the dominant source of the parasympathetic, sympathetic, and sensory fibers that innervate the nasal respiratory mucosa. Therefore, posterior nasal neurectomy (PNN) may induce denervation of the nasal mucosa and may relieve the nasal symptoms of rhinorrhea. PNN can deplete nerve fibers, choline acetyltransferase, and neuropeptides in nasal respiratory mucosa .Therefore, PNN-induced nasal mucosal denervation should contribute to the suppression of the rhinorrhea reaction. **(2)**

Selective resection of this posterior nasal nerve removes the parasympathetic supply from the nasal cavity and provides the same benefits of vidian neurectomy, without having any of its complications.**(1)**

PNN resection appears to be a safe procedure that induces apparent histological changes and is sustainable for at least 48 months. Thus, the selective resection of PNN can be a successful treatment for allergic and non-allergic rhinitis.**(6)**

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