Triamcinolone Impregnated Nasal Pack in Endoscopic Sinus Surgery: Our Experience

V. Sabarinath¹ · M. R. Harish¹ · Shilpa Divakaran²

Received: 22 July 2016 / Accepted: 21 December 2016 / Published online: 11 January 2017
© Association of Otolaryngologists of India 2017

Abstract The selection of an effective packing method to prevent postoperative complications and recurrence following Endoscopic Sinus Surgery remains ambiguous at present. This study was conducted to evaluate the efficacy of Triamcinolone impregnated nasal pack in Endoscopic Sinus Surgery, in the prevention of postoperative crusting, edema, infection and recurrence. This study was an interventional randomized placebo-controlled study, conducted at a tertiary care centre in South India between February 2015 and May 2016, after getting approval from Institute Ethical Committee. 75 patients with bilateral chronic rhinosinusitis undergoing Endoscopic Sinus Surgery were selected for the study. After surgery, each patient was randomized to receive Polyvinyl Acetal (Merocel) nasal pack soaked with Triamcinolone to one side, while the contralateral side was packed with Merocel soaked with saline. Incidence of postoperative crusting, edema, polypoidal change and mucosal discharge was evaluated using the Endoscopic Staging System at 1st and 2nd weeks and at 1st and 3rd months of surgery. A significant reduction in mucosal edema was observed in the test group at all stages of follow up (p values <0.05). Incidence of crusting was found to be significantly lower in the test group (p values <0.05) except at 3 months (p value >0.05). However, there was no significant difference in the occurrence of polypoidal change and mucosal discharge between the groups. Triamcinolone impregnated nasal pack is an effective

method to reduce the incidence of early postoperative complications following Endoscopic Sinus Surgery.

Keywords Triamcinolone · Topical steroids · Steroid nasal pack · Endoscopic sinus surgery · Crusting · Recurrent nasal polyposis

Introduction

Rhinosinusitis is one of the most common reasons for an individual seeking medical care in an otolaryngology set-up [1]. Chronic rhinosinusitis (CRS) is characterized by mucosal inflammation of nose and paranasal sinuses, with or without polyp formation. By definition, symptoms should last for a minimum duration of 12 consecutive weeks to make a diagnosis of CRS [2]. Symptoms include nasal obstruction, loss of smell, running nose, head ache, facial pain, sneezing and post nasal discharge. One of the important etiological factors associated with CRS is allergy. The inflammatory mucosal oedema induced by allergy causes obstruction of the sinus ostia and stasis of secretions [3]. Medical treatment of CRS, therefore, focuses on relieving the mucosal edema and obstruction of the ostia, re-establishing sinus ventilation and drainage. Role of corticosteroids in the management of CRS with or without polyps has been well established [4]. Antibiotics and mucolytics are used as an adjunct to steroids. Surgery is indicated when medical treatment over a period of 3–4 weeks fails. In nasal polyposis, however, surgery is almost always indicated, because medical treatment with steroids cannot eliminate polyps; but they do reduce the polyp size [4, 5]. Introduction and popularization of Endoscopic Sinus Surgery (ESS) was a revolutionary milestone in the history of surgical management of CRS.

✉ Shilpa Divakaran
dr.d.shilpa@gmail.com

¹ Sri Manakula Vinayagar Medical College and Hospital, Madagadipet, Puducherry, India

² Pondicherry Institute of Medical Sciences, Kalapet, Puducherry, India

Precise disease clearance with preservation of mucociliary clearance mechanism of sinonasal mucosa led to the development of Functional Endoscopic Sinus Surgery (FESS). Postoperative crusting and synechiae formation are two major causes of failure of ESS. Meticulous postoperative care with frequent nasal douching can prevent crusting and adhesions to a great extent [6]. Perioperative use of topical agents like Mitomycin C and corticosteroids has been found to reduce the incidence of synechiae formation in these patients [7–9]. This study attempts to evaluate the efficacy of Triamcinolone impregnated nasal pack in the prevention of postoperative complications like crusting, mucosal edema and recurrence, in patients undergoing ESS.

Materials and Methods

This study was an interventional randomized placebo-controlled study, conducted at a tertiary care centre in South India between February 2015 and May 2016, after getting approval from Institute Ethical Committee. 75 adult patients with bilateral CRS refractory to medical treatment were included in the study after obtaining informed consent. Patients with gross deviation of septum, invasive fungal sinusitis, suspected malignancy, past history of nasal surgery and uncontrolled systemic diseases were excluded.

All routine pre-operative investigations were done including a computed tomography of paranasal sinuses. All patients were operated under local anesthesia. Bilateral middle meatal antrostomy, anterior ethmoidectomy and posterior ethmoidectomy were done in all patients. At the conclusion of surgery, each patient received Merocel (4 cm) nasal pack soaked with Triamcinolone (2 ml of 40 mg/ml solution) to one of the randomly selected nasal cavities, while the contralateral nasal cavity was packed with Merocel (4 cm) soaked with saline, which served as the control. Randomization of each patient to either the left or the right nasal cavity for the placement of Triamcinolone nasal pack was done by using computer generated random numbers.

The nasal pack was removed on the second postoperative day. Nasal douching was done on the 3rd day of surgery. At the time of discharge, patients were instructed to do alkaline nasal douche four to five times a day. Patients were reviewed on 1st and 2nd weeks and at 1st and 3rd months and were scored according to the postoperative endoscopic grading system [2] in which the following parameters were assessed (each carrying a minimum score of 0 and a maximum score of 2)

- Crusting (Absent; Mild; Severe)
- Edema (Absent; Mild; Severe)

- Polypoidal change (Absent; Mild; Severe)
- Discharge (Absent; thin/clear; thick/purulent).

Statistical analysis was done using the Mac Nemar's test. A *p* value of less than 0.05 was considered significant.

Results

Out of 75 patients recruited for the study, 39 were females and 36 were males, with a mean age of 30.4. Since each patient served as his or her own control in this study, baseline characteristics like age and gender were similar between test and control groups. 34 patients (24 females and 10 males) had allergic symptoms including frequent sneezing, bilateral watery nasal discharge, watering of eyes, nasal block and itching sensation in nose and eyes.

Mucosal edema was present in everyone in the saline group in the first week and in only 68% in the triamcinolone group. Though mucosal edema improved over time in the saline group, the difference remained statistically significant during the entire period of follow up (Table 1). A reduced incidence of crusting was observed in the test group compared to the control group, and the difference was found to be statistically significant at 1st week and at 1st month of surgery. The differences observed at 2nd week and at 3rd month of follow up were statistically insignificant (Table 2).

No polypoidal changes were detected in the test group during the first and second weeks. By the end of 3 months, 2.6% in the test group and 13.3% in the control group had polypoidal changes. Though such changes were detected in both the groups at 1st and 3rd month of follow up, the difference was found to be statistically insignificant (Table 3).

During the first two follow-ups majority of patients in both the groups had thin clear discharge, 81.3 and 69.3%, respectively. There was no difference in the incidence or type of mucosal discharge in both groups during the entire follow up (Table 4).

Discussion

In the study group, it was found that, 45.3% of patients had allergic symptoms. Many previous studies have proven beyond doubt that allergy is closely related to the development of chronic rhinosinusitis [10]. Prevalence of allergy in patients with CRS was found to be 25–50% [1]. Mucosal inflammation and edema induced by allergy cause ciliary dysfunction and obstruction of sinus ostia, leading to the development of chronic rhinosinusitis. Postoperative mucosal edema and crusting interfere with sinus ventilation

Table 1 Mucosal edema in both the groups at each visit

Follow-up	Group	Endoscopic grading			<i>p</i> value
		Absent n (%)	Mild n (%)	Severe n (%)	
1 week	Triamcinolone	51 (68)	24 (32)	0 (0)	<0.001
	Saline	0 (0)	27 (36)	48 (64)	
2 weeks	Triamcinolone	73 (97.3)	0 (0)	2 (2.7)	<0.001
	Saline	19 (25.3)	33 (44)	23 (30.7)	
1 month	Triamcinolone	74 (98.7)	1 (1.3)	0 (0)	<0.001
	Saline	52 (69.3)	23 (30.7)	0 (0)	
3 months	Triamcinolone	75 (100)	0 (0)	0 (0)	<0.001
	Saline	62 (82.7)	0 (0)	13 (17.3)	

Table 2 Crusting in both the groups at each visit

Follow-up	Group	Endoscopic grading			<i>p</i> value
		Absent n (%)	Mild n (%)	Severe n (%)	
1 week	Triamcinolone	67 (89.3)	8 (10.7)	0 (0)	<0.001
	Saline	51 (68)	24 (32)	0 (0)	
2 weeks	Triamcinolone	18 (24)	57 (76)	0 (0)	0.094
	Saline	18 (24)	49 (65.3)	8 (10.7)	
1 month	Triamcinolone	70 (93)	5 (6.7)	0 (0)	0.039
	Saline	63 (84)	12 (16)	0 (0)	
3 months	Triamcinolone	71 (94.7)	4 (5.3)	0 (0)	0.08
	Saline	63 (84)	12 (16)	0 (0)	

Table 3 Polypoid changes in both the groups at each visit

Follow-up	Group	Endoscopic grading			<i>p</i> value
		Absent n (%)	Mild n (%)	Severe n (%)	
1 week	Triamcinolone	75 (100)	0 (0)	0 (0)	>0.05
	Saline	74 (98.6)	1 (1.4)	0 (0)	
2 weeks	Triamcinolone	75 (100)	0 (0)	0 (0)	>0.05
	Saline	74 (98.6)	1 (1.4)	0 (0)	
1 month	Triamcinolone	75 (100)	0 (2.6)	0 (0)	>0.05
	Saline	73 (97.3)	2 (2.6)	0 (0)	
3 months	Triamcinolone	73 (97.3)	2 (2.6)	0 (0)	>0.05
	Saline	65 (86.6)	9 (12)	1 (1.3)	

and drainage of secretions, which can lead to infection and recurrence of disease. The study showed a statistically significant reduction in the incidence of postoperative mucosal edema in the test group compared to the control group, during the entire period of follow up (Table 1). This can be attributed to the potent anti-inflammatory action of

Triamcinolone, which reduces the inflammatory response of the sinonasal mucosa, thereby reducing mucosal edema [11].

There was a statistically significant reduction in the incidence of postoperative crusting in the test group at 1st week and at 1st month of surgery. The inflammatory

Table 4 Nasal discharge in both the groups at each visit

Follow-up	Group	Endoscopic grading			<i>p</i> value
		Absent n (%)	Thin; clear n (%)	Thick; purulent n (%)	
1 week	Triamcinolone	14 (18.7)	61 (81.3)	0 (0)	>0.05
	Saline	14 (18.7)	61 (81.3)	0 (0)	
2 weeks	Triamcinolone	23 (30.7)	52 (69.3)	0 (0)	>0.05
	Saline	23 (30.7)	52 (69.3)	0 (0)	
1 month	Triamcinolone	69 (92)	6 (8)	0 (0)	>0.05
	Saline	63 (84)	12 (16)	0 (0)	
3 months	Triamcinolone	74 (98.6)	1 (0)	0 (0)	>0.05
	Saline	72 (96)	3 (4)	0 (0)	

changes induced by the surgical intervention results in a temporary impairment of mucociliary clearance, which leads to stagnation of secretions and crusting [6]. The topically applied Triamcinolone, due to its anti-inflammatory properties, results in early return of the mucociliary action, thereby reducing the incidence of crust formation. The difference in the incidence of crusting observed at 2nd week and at 3rd month of follow up was found to be statistically insignificant.

The study did not show a statistically significant reduction in the incidence of polypoidal changes in the triamcinolone group, compared to the control group. This does not correlate with previous studies which showed a reduced incidence of recurrence with the use of topical steroids following endoscopic sinus surgery [7, 12, 13]. Topical corticosteroids effectively reduce the hyper reactivity and vascular permeability of sinonasal mucosa, thereby reducing the incidence of polypoidal changes and recurrence [11]. Some of these studies had also given steroids orally or in the form of topical sprays. This could be the possible explanation for reduced recurrence rate.

The incidence of mucosal discharge in both control and test groups were the same at 1st and 2nd weeks of follow up. The nature of discharge was clear and thin. However, there was no difference between the two groups at any visit. This again is in contrast to previous studies on the effect of topical steroids on wound healing following endoscopic sinus surgery [7]. Clear and thin discharge is an indicator of inflammatory response of the mucosa. At the same time, thick and purulent discharge indicates infection, which can be secondary to mucosal edema, crusting or polypoidal changes, all of which interfere with sinus ventilation and drainage. The topically applied Triamcinolone, by reducing the mucosal edema, crusting and polypoidal change, improves sinus ventilation and drainage, thereby reducing chances of postoperative infection.

The type of nasal pack used as the middle meatal spacer is thought to have some effect on the post operative outcomes in ESS. In our study, we used Triamcinolone soaked Merocel, which is a non absorbable nasal pack. In a study comparing the efficacy of Nasopore and Merocel as nasal packs following ESS, it was found that, the absorbable nasal pack (Nasopore) was associated with significantly slower mucosal healing initially, an effect that disappeared after 3 months postoperatively [14]. At the same time, another study done by Bugten et al. [15] showed that, a non absorbable nasal pack in the middle meatus for 5 days after ESS significantly reduced the extent of adhesions compared with saline irrigation alone.

Conclusion

The anti-inflammatory property of topically applied Triamcinolone reduces the mucosal edema and helps early return of the mucociliary action of the sinonasal mucosa. This further reduces crusting, thereby improving wound healing. Triamcinolone also decreases the infiltration of inflammatory cells, and reduces the hyper reactivity and vascular permeability of nasal mucosa. This study showed a significant reduction in the incidence of mucosal edema and crusting in the nasal cavities which received Triamcinolone impregnated non absorbable nasal pack following endoscopic sinus surgery, indicating the efficacy of topically applied Triamcinolone in overcoming the early post-operative challenges in patients with Chronic rhinosinusitis. However, there was no significant reduction in early recurrence or nasal discharge. The role of topical triamcinolone in reducing polypoidal changes and infection is still an unanswered query.

Compliance with ethical standards

Conflict of interest No conflict of interest to be declared.

References

1. Murr AH et al (2011) Safety and efficacy of a novel bioabsorbable, steroid eluting sinus stent. *Int Forum Allergy Rhinol* 1(1):23–32
2. Benninger MS, Ferguson BJ, Hadley JA et al (2003) Adult chronic rhinosinusitis: definitions, diagnosis, epidemiology, and pathophysiology. *Otolaryngol Head Neck Surg* 129:S1–S32
3. Krouse J (2000) CT stage, allergy testing and quality of life in patients with sinusitis. *Otolaryngol Head Neck Surg* 123:389–391
4. Joe SA, Thambi R, Huang J (2008) A systematic review of the use of intranasal steroids in the treatment of chronic rhinosinusitis. *Otolaryngol Head Neck Surg* 139:340–347
5. Fokkens WJ, Lund VJ, Mullol J et al (2007) European position paper on nasal polyps 2007. *Rhinology* 45(Suppl 20):1–139
6. Kaluskar SK, Sachdeva S (2006) Perioperative and delayed postoperative complications. *Complic Endosc Sinus Surg Diagn Prev Manag* 2:101–113
7. Jorissen M, Bachert C (2009) Effect of corticosteroids on wound healing after endoscopic sinus surgery. *Rhinology* 47(3):280–286
8. Stjerne Par et al (2009) Use of mometasone furoate to prevent polyp relapse after endoscopic sinus surgery. *Arch Otolaryngol Head and Neck Surgery*. 135:296–302
9. Venkatraman V et al (2012) Topical Mitomycin C in functional endoscopic sinus surgery. *Eur Arch Otorhinolaryngol* 209(7):1791–1794
10. Benninger MS (1992) Rhinitis, sinusitis, and their relationship to allergies. *Am J Rhinol* 6:37–43
11. Bachert C, Hormann K, Mosges R et al (2003) An update on the diagnosis and treatment of sinusitis and nasal polyposis. *Allergy* 58:176–191
12. Al-Husban H, Nawasreh O, Al-Raggad D (2010) The efficacy of preoperative short course of oral steroids followed by postoperative topical nasal steroids sprays on nasal polyp recurrence after endoscopic nasal polypectomy. *J R Med Serv* 17(4):56–60
13. David WJ, Wright ED (2010) Triamcinolone-impregnated nasal dressing following endoscopic sinus surgery: a randomized, double-blind, Placebo-controlled study. *Laryngoscope* 120:1269–1273
14. Shoman N et al (2009) Prospective, double-blind, randomized trial evaluating patient satisfaction, bleeding, and wound healing using biodegradable synthetic polyurethane foam (NasoPore) as a middle meatal spacer in functional endoscopic sinus surgery. *J Otolaryngol Head Neck Surg* 38(1):112–118
15. Bugten V et al (2006) Effects of non absorbable packing in middle meatus after sinus surgery. *Laryngoscope* 116(1):83–88