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Effect of pregabalin premedication on the dose of dexmedetomidine infusion for induced hypotension in functional endoscopic sinus surgery

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Abstract
Functional Endoscopic Sinus Surgery (FESS) requires dry surgical area in order for the surgeon to recognize the structure accurately as the anatomical structure of the surrounding area is complicated and the surgical site is near to the eye, brain, cranial base, important vessels and nerves. Excess bleeding leads to defective visibility and causes major complications during FESS. Dry surgical area can be produce by controlled hypotension techniques. Pregabalin are GABA pentanoids when given orally, its peak in plasma reaches within 1 hour. In this study we estimate the effect of pregabalin on celebrate hypotension surgical site quality during FESS, Intraoperative infusion dose of dexmedetomidine. and recovery time from anaesthesia. The objective of my study was to contemplate the effect of pregabalin premedication on the dosage of dexmedetomidine. Primary end point of the study is overall dose of dexmedetomidine and the recovery time in minutes. Secondary end points are the Intraoperative hemodynamic parameters.

The present study was planned in the Department of Anaesthesiology and Critical Care, Indira Gandhi Institute of Medical Sciences, Patna. 50 patients scheduled for elective FESS, were randomized in two groups with 25 patients in each group. Group C is the Control group received placebo capsule (similar to pregabalin) 1 hour before surgery and Group P is Pregabalin group received Pregabalin 150 mg capsule orally 1 hour before surgery.

The data generated from the present study concludes that by the use of oral Pregabalin there is decrease in the total dose of Dexmedetomidine improvement in the quality of the surgical site during FESS, and also there is decrease in post-operative recovery time. Also dexmedetomidine offers the advantage of inherent analgesic, sedative and aesthetic sparing effect.

Keywords: pregabalin premedication, dexmedetomidine infusion, hypotension, functional endoscopic sinus surgery, FESS

Introduction

Functional endoscopic sinus surgery (FESS) is a minimally invasive surgical treatment which uses nasal endoscopes to enlarge the nasal drainage pathways of the paranasal sinuses to improve sinus ventilation. This procedure is generally used to treat inflammatory and infectious sinus diseases, including chronic rhinosinusitis that doesn't respond to drugs, nasal polyps, some cancers, and decompression of eye sockets/optic nerve in Graves's ophthalmopathy [1]. In the surgery, an otolaryngologist removes the uncinate process of the ethmoid bone, while visualizing the nasal passage using a fiberoptic endoscope. FESS can be performed under local anesthesia as an outpatient procedure. Generally patients experience only minimal discomfort during and after surgery. The procedure can take from 2 to 4 hours to complete [2].

Functional Endoscopic Sinus Surgery is most commonly used to treat chronic rhinosinusitis, only after all non-surgical treatment options such as antibiotics, topical nasal corticosteroids, and nasal lavage with saline solutions have been exhausted. Chronic rhinosinusitis (CRS) is an inflammatory condition in which the nose and at least one sinus become swollen and interfere with mucus drainage. It can be caused by anatomical factors such as a deviated septum or nasal polyps (growths), as well as infection. Symptoms include difficulty breathing through the nose, swelling and pain around the nose and eyes, postnasal drainage down the throat, and difficulty sleeping. CRS is a common condition in pediatric patients and young adults [3]. The purpose of FESS in treatment of CRS is to remove any anatomical obstructions that prevent proper mucosal drainage. A standard FESS includes removal of the uncinate process, and opening of the anterior ethmoid air cells and Haller cells as well as the maxillary ostium, if necessary. If any nasal polyps obstructing ventilation or drainage are present, they are also removed. In the case of paranasal sinus/nasal cavity tumors (benign or cancerous), an otolaryngologist can perform FESS to remove the growths, sometimes with the help of a neurosurgeon, depending on the extent of the tumor. In some cases, a graft of bone or skin is placed by FESS to repair damages by the tumor [4].

In the thyroid disorder known as Graves Ophthalmopathy, inflammation and fat accumulation in the orbit nasal region cause severe proptosis. In cases that have not responded to corticosteroid treatment, FESS can be used to decompress the orbital region by removing the ethmoid air cells and lamina papyracea. Bones of the orbital cavity or portions of the orbital floor may also be removed [5]. The endoscopic

approach to FESS is a less invasive method than open sinus surgery, which allows patients to be more comfortable during and after the procedure. Entering the surgical field via the nose, rather than through an incision in the mouth as in the previous Caldwell-Luc method, decreases risk of damaging nerves which enervate the teeth [1]. Because of its less-invasive nature, FESS is a common option for children with CRS or other sinonasal complications. unctional Endoscopic Sinus Surgery is considered a success if most of the symptoms, including nasal obstruction, sleep quality, olfaction and facial pain, are resolved after a 1-2 month postoperative healing period. Reviews of FESS as a method for treating chronic rhinosinusitis have shown that a majority of patients report increased quality of life after undergoing surgery. The success rate of FESS in treating adults with CRS has been reported as 80-90% [6], and the success rate in treating children with CRS has been reported as 86-97%. The most common complication of FESS is cerebrospinal fluid leak (CSFL), which has been observed in about 0.2% of patients. Generally, CSFL arises during surgery and can be repaired with no additional related complications postoperatively. Other risks of surgery include infection, bleeding, double vision usually lasting a few hours, numbness of the front teeth, orbital hematoma, decreased sense of smell, and blindness [2, 19]. Blindness is the single most serious complication of FESS, and results from damage to the optic nerve during surgery. Serious complications such as blindness occur in only 0.44% of cases, as determined by a study performed in the United Kingdom [1]. A Cochrane review in 2006 based on three randomized control trials concluded that FESS has not been shown to provide significantly better results than medical treatment for chronic rhinosinusitis [7].

Dexmedetomidine is most often used in the intensive care setting for light to moderate sedation. It is not recommended for long-term deep sedation. A feature of dexmedetomidine is that it has analgesic properties in addition to its role as a hypnotic, but is opioid sparing; thus, it is not associated with significant respiratory depression (Unlike protocol). Many studies suggest dexmedetomidine for sedation in mechanically ventilated adults may reduce time to extubating and ICU stay. People on dexmedetomidine can be reusable and cooperative, a benefit in some procedures. Compared with other sedatives, some studies suggest dexmedetomidine may be associated with less delirium. However, this finding is not consistent across multiple studies. At the very least, when aggregating many study results together, use of dexmedetomidine appears to be associated with less neurocognitive dysfunction compared to other sedatives. Whether this observation has a beneficial psychological impact is unclear. From an economic perspective, dexmedetomidine is associated with lower ICU costs, largely due to a shorter time to extubation [8].

Functional Endoscopic Sinus Surgery (FESS) requires dry surgical area in order for the surgeon to recognize the structure accurately as the anatomical structure of the surrounding area is complicated and the surgical site is near to the eye, brain, cranial base, important vessels and nerves [9]. Excess bleeding leads to defective visibility and causes major complications during FESS.

Dry surgical area can be produce by controlled hypotension techniques. Pregabalin are GABA pentanoids when given orally, its peak in plasma reaches within 1 hour. In this study we estimate the effect of pregabalin on delebrate hypotension surgical site quality during FESS, Intraoperative infusion dose of dexmedetomidine. and recovery time from anaesthesia. The objective of my study was to contemplate the effect of pregablin premedication on the dosage of dexmedetomidine. Primary end point of the study is overall dose of dexmedetomidine and the recovery time in minutes. Secondary end points are the Intraoperative hemodynamics parameters.

Methodology

The present study was planned in the Department of Anaesthesiology and Critical Care, Indira Gandhi Institute of Medical Sciences, Patna. 50 patients scheduled for elective FESS, were randomized in two groups with 25 patients in each group. Group C is the Control group received placebo capsule (similar to pregabalin) 1 hour before surgery and Group P is Pregabalin group received Pregabalin 150 mg capsule orally 1 hour before surgery. In both groups, patients received loading dose of 1 μ/kg dexmedetomidine diluted in 10 ml 0.9% saline infused over 10 min after anesthetized the patients but before the surgery followed by continuous infusion of (0..4- 0.8 μ/kg/h).In both groups infusion rate was titrated to maintain MAP within 60-65 mmHg.

All the patients were informed consents. The aim and the objective of the present study were conveyed to them. Approval of the institutional ethical committee was taken prior to conduct of this study.

After full recovery, patients were transferred to the postanesthesia care unit and monitored for respiratory depression (respiratory rate <8 breaths/min), hemodynamic changes, nausea/vomiting, shivering, or any other drug-induced side effects. Postoperative recovery was evaluated using a modified Aldreth's score (0-10) and time needed to achieve 9 or more was recorded. Patients were also asked about recalling intraoperative events or any sign of awareness [10].

Results & Discussion

The development of a nasal endoscope has facilitated the surgical treatment (FESS) of acute and chronic sinus pathologies when conservative treatment fails. The procedure perpetuates the mucociliary clearance mechanism and conserves the normal no obstructing anatomic structures. However, major or minor complications could occur as bleeding reduces the visibility of the operative field and hampers the surgical intervention.

Previous studies showed that different opioids could achieve an oligemic surgical field, but the clearance of remifentanil was the most rapid, with side effects of nausea, vomiting, respiratory depression, pruritus, sinus bradycardia, and hypotension [11-12]. Preoperative steroid administration in cases of severe nasal polyposis improves visibility because of its anti-inflammatory and antiedematous effect [13]. Topical vasoconstrictors are applied to decrease mucosal congestion and bleeding, but hypertension and tachycardia may occur. Controlled hypotension is commonly used nowadays to achieve a bloodless operative field. The efficacy of dexmedetomidine in providing an ideal surgical field during controlled hypotension has been reported previously during middle ear and maxillofacial surgery. Its hemodynamic effects are predictable and dose dependent. Many studies have investigated the effects of dexmedetomidine before induction of anesthesia and

reported a significant reduction in heart rate and blood pressure [14-15].

A lot of efforts have been done to optimize the surgical conditions for FESS. Induced hypotension has been widely advocated to control bleeding during FESS to improve the quality of surgical field [16-17].

50 patients joined the study (25 in each group), no patients were excluded. Regarding demographic data, duration of surgery, and ASA physical status both groups were comparable (p>0.05). The overall dose of dexmedetomidine used patients was significantly lower in group (P) than in group (C), (33.4 ± 5.5 µg versus 36.1 ± 8.5 µg) (p=0.001) The surgical field quality was better in group (p) than group (C) as ACS was significantly lower in group (P) compared to group (C) (p- 0.03). Quality of surgical field using Average Category Scale (ACS) is given in Table 2.

Table 1: Overall Dose of dexmedetomidine

Overall Dose	Group C	Group P
	Control group received placebo capsule	Pregabalin group received Pregabalin 150 mg capsule
Dexmeditomidine	36.1 ± 8.5 µg	33.4 ± 5.5 µg

Table 2: Average Category Scale (ACS)

Average Category Scale (ACS)		Group C	Group P	P - Value
0	No. of Cases	3	6	0.031
	Percentage of Cases	7.5	15	
1	No. of Cases	12	12	
	Percentage of Cases	30	55	
2	No. of Cases	24	15	
	Percentage of Cases	60	37.5	
3	No. of Cases	5	4	
	Percentage of Cases	12.5	10	
4	No. of Cases	6	3	
	Percentage of Cases	15	7.5	
5	No. of Cases	0	0	
	Percentage of Cases	0	0	

Our results were supported by Mahmoud *et al*. who used gabapentin (which belong to the same group of drugs of pregabalin) preoperatively during FESS and observed that gabapentin reduced the dose of hypotensive agent used during surgery and hypotension which resulted in reduction of the volume of blood loss during FESS. [18] Our result were supported by Marouf *et al*. who used pregabalin (150 mg) preoperatively during FESS, observed that pregabalin decreases the hypotensive agent and improved the quality of the surgical site during FESS. [19] In contrast to our result Chang SH *et al*. observed that 300 mg pregabalin preoperative didn't reduce postoperative pain and the incidence of sedation was high in the early postoperative period. [20]

Guven *et al*. [21] and Goksu *et al*., [22] reported better hemodynamic stability, visual analog scale for pain and clear surgical field with less side effects in DEX group than placebo group when FESS done under either conscious sedation or local anesthesia respectively. This study demonstrated prolonged postoperative analgesia in (DEX) group. This is in accordance with Gurbet *et al*. [23] who stated that intraoperative infusion of dexmedetomidine reduces perioperative analgesic requirements. Also the analgesic effects of dexmedetomidine had been appreciated in various setting and various population [24].

The optimal anesthetic technique seems to be relative bradycardia with associated hypotension. Ulger *et al* compared dexmedetomidine with nitroglycerin to achieve controlled hypotension in patients scheduled for middle ear surgeries. The infusion rate of drugs was titrated to maintain a mean arterial pressure between 65 and 75 mmHg. They concluded that dexmedetomidine was better in maintaining hemodynamic stability and a drier surgical field, and did not cause reflex tachycardia or rebound hypertension [25].

Dexmedetomidine exerts sedative and analgesic sparing effects through central actions in the locus coeruleus and in the dorsal horn of the spinal cord. In the present study, the induction dose of propofol was significantly lower in patients of group D, which is in agreement with the results of other workers who reported that dexmedetomidine caused a reduction in the overall dose of propofol required to produce loss of consciousness and verbal command [26].

Dexmedetomidine was associated with significantly longer emergence time and time to total recovery from anesthesia. Richa *et al*. [27] reported a significantly slower extubation time in patients receiving dexmedetomidine compared with those receiving remifentanil for controlled hypotension. In the present study, patients of the dexmedetomidine group had slower but smooth emergence from anesthesia compared with the control group [28].

Conclusion

The data generated from the present study concludes that by the use of oral Pregabalin there is decrease in the total dose of dexmedetomidine improvement in the quality of the surgical site during FESS, and also there is decrease in post-operative recovery time. Also dexmedetomidine offers the advantage of inherent analgesic, sedative and anesthetic sparing effect.

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