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Original Research

Efficacy of dexmedetomidine and remifentanil hydrochloride in endoscopic sinus surgery

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ABSTRACT:

Background: In endoscopic sinus surgery (ESS), controlled hypotension is frequently utilized to reduce intraoperative bleeding and enhance operative field visualization. Intraoperative bleeding raises the risk of complications and degrades the surgical field environment. The present study was conducted to compare the efficacy of dexmedetomidine and remifentanil hydrochloride in endoscopic sinus surgery. **Materials & Methods:** 70 patients scheduled for elective endoscopic sinus surgery of both genders were divided into 2 groups of 35 each. Group I received remifentanil 1 µg/kg over 1 minute at anesthesia induction, followed by 0.2 to 0.4 µg/kg per minute infusion during maintenance and group II received dexmedetomidine 1 µg/kg over 10 minutes at anesthesia induction, followed by 0.4 to 0.8 µg/kg per hour infusion during maintenance. Surgical conditions, hemodynamic parameters, intraoperative blood loss, time to extubation, sedation, and pain in the postanesthesia care unit (PACU) were recorded.**Results:** There were 20 males and 15 females in group I and 18 males and 17 females in group II. The mean weight was 65.2 kgs and 67.3 kgs, height was 167.4 cms and 166.9 cms and ASA grade I/II was seen in 17:17 and 16:19 in group I and II respectively. The difference was non- significant (P> 0.05). In group I and group II, mean surgical field score was 2.7 and 2.9, surgical time (mins.) was 64.2 and 62.8, anesthesia time (min) was 84.2 and 79.5, blood loss (ml) was 172.3 and 215.4 and extubation time (min) was 7.4 and 8.2 respectively. The difference was non- significant (P> 0.05). There was non- significant difference in MOAA/S score and pain score in both groups at different time intervals (P> 0.05).**Conclusion:** For patients having ESS under general anesthesia, remifentanil and dexmedetomidine can both produce comparable, sufficient degrees of hypotensive anesthesia. Remifentanil-treated patients, however, showed a quicker recovery in the first few days following surgery.

Keywords: endoscopic sinus surgery, Pain, postanesthesia

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INTRODUCTION

In endoscopic sinus surgery (ESS), controlled hypotension is frequently utilized to reduce intraoperative bleeding and enhance operative field visualization. Intraoperative bleeding raises the risk of complications and degrades the surgical field environment.[1] Numerous substances have been employed, such as magnesium sulfate, β-adrenergic antagonists (propranolol and esmolol), vasodilators (sodium nitroprusside and nitroglycerine), and high dosages of strong inhalation anesthetics (isoflurane).[2] Reflex tachycardia, rebound hypertension, tachyphylaxis, sodium nitroprusside-induced cyanide poisoning, and the potential for myocardial depression from esmolol are among the drawbacks of each medication. Excessive inhalation anesthetic dosages may cause a patient's recovery to take longer and postpone their hospital discharge.[3]

A short-acting µ-opioid receptor agonist, remifentanil hydrochloride has an analgesic potency comparable to fentanyl. It has been shown that remifentanil can produce a bloodless operating field without the requirement for extra strong hypotensive medications. Its capacity to reduce blood pressure, heart rate, and cardiac output may mediate this action. Compared to other opioid analgesics, remifentanil has provided better surgical field conditions.[4] According to recent findings, the controlled hypotension approach with the

best benefit/risk ratio seems to be remifentanil paired with either propofol or an inhalation anesthetic.[5] Dexmedetomidine is a potent α-2 agonist with a receptor affinity 8 times higher than that of clonidine. Alpha-2 agonists have sympatholytic, sedative, anesthetic, and analgesic sparing effects, as well as vasoconstrictive effects.[6] The present study was conducted to compare the efficacy of dexmedetomidine and remifentanil hydrochloride in endoscopic sinus surgery.

MATERIALS & METHODS

The study was carried out on 70 patients scheduled for elective endoscopic sinus surgery of both genders. All gave their written consent to participate in the study. Data such as name, age, gender etc. was recorded. The patients were divided into 2 groups of 35 each. Propofol, 2 to 2.5 mg/kg, was administered to both groups to induce anesthesia, which was maintained with desflurane. Group I received remifentanil 1 µg/kg over 1 minute at anesthesia induction, followed by 0.2 to 0.4 µg/kg per minute infusion during maintenance and group II received dexmedetomidine 1 µg/kg over 10 minutes at anesthesia induction, followed by 0.4 to 0.8 µg/kg per hour infusion during maintenance. Surgical conditions, hemodynamic parameters, intraoperative blood loss, time to extubation, sedation, and pain in the postanesthesia care unit (PACU) were recorded. Results thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS

Table I Demographic data

Parameters	Group I	Group II	P value
M:F	20:15	18:17	0.94
Weight (kgs)	65.2	67.3	0.81
Height (cms)	167.4	166.9	0.73
ASA (I/II)	17:17	16:19	0.15

Table I shows that there were 20 males and 15 females in group I and 18 males and 17 females in group II. The mean weight was 65.2 kgs and 67.3 kgs, height was 167.4 cms and 166.9 cms and ASA grade I/II was seen in 17:17 and 16:19 in group I and II respectively. The difference was non- significant (P> 0.05).

Table II Intraoperative parameters

Parameters	Group I	Group II	P value
Surgical field score	2.7	2.9	0.18
Surgical time (mins.)	64.2	62.8	0.24
anesthesia time (min)	84.2	79.5	0.69
Blood loss (ml)	172.3	215.4	0.52
extubation time (min)	7.4	8.2	0.90

Table II, graph I shows that in group I and group II, mean surgical field score was 2.7 and 2.9, surgical time (mins.) was 64.2 and 62.8, anesthesia time (min) was 84.2 and 79.5, blood loss (ml) was 172.3 and 215.4 and extubation time (min) was 7.4 and 8.2 respectively. The difference was non- significant (P> 0.05).

Graph I Intraoperative parameters

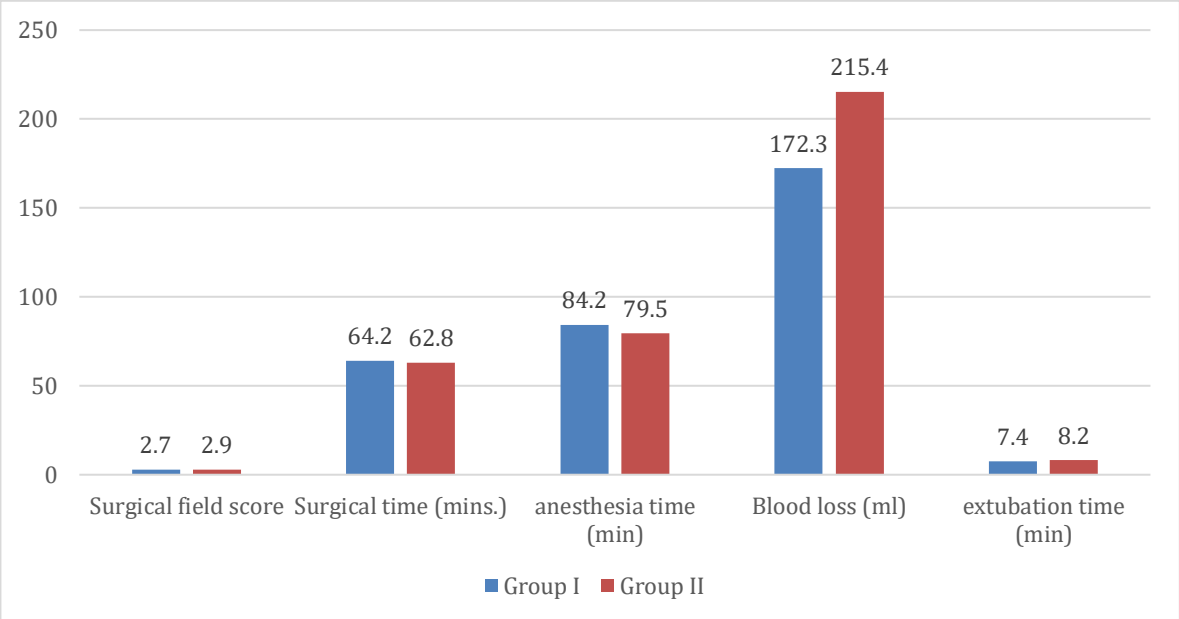

Table III Assessment of MOAA/S and pain in both groups

Parameters	Variables	Group I	Group II	P value
MOAA/S score	On arrival at PACU	3.7	2.7	0.41
	After 30 minutes	4.3	4.3	
	After 60 minutes	5.1	4.8	
Pain score	On arrival at PACU	0.35	0.33	0.65
	After 30 minutes	0.81	0.68	
	After 60 minutes	0.72	0.53	

Table III shows that there was non- significant difference in MOAA/S score and pain score in both groups at different time intervals (P> 0.05).

DISCUSSION

Central nervous system activation of postsynaptic receptors by dexmedetomidine leads to suppression of sympathetic activity, which decreases blood pressure and heart rate. Dexmedetomidine augments hypotensive effect and minimizes intraoperative bleeding.[7] The effectiveness of different intentional hypotension techniques in preventing bleeding under anesthesia has been extensively studied in numerous research. Even slight bleeding could make it more difficult to see the surgical field or take longer to complete the procedure during ESS.[8,9] In addition to improving surgical conditions and reducing surgical blood loss, deliberate surgical hypotension is recommended for reducing operative bleeding in procedures requiring a bloodless operating field and having a low to moderate risk of hemorrhage, such as middle ear microsurgery and ESS. The majority of patients in both groups had surgical field scores of 2 to 3, which indicates at least a good operating field, and the goal MAP range used in this study was 65 to 75 mm Hg.[10] The present study was conducted to compare the efficacy of dexmedetomidine and remifentanil hydrochloride in endoscopic sinus surgery.

We found that there were 20 males and 15 females in group I and 18 males and 17 females in group II. The mean weight was 65.2 kgs and 67.3 kgs, height was 167.4 cms and 166.9 cms and ASA grade I/II was seen in 17:17 and 16:19 in group I and II respectively. Lee et al[11] compared the efficacy of dexmedetomidine and remifentanil hydrochloride in intraoperative field conditions and recovery during endoscopic sinus surgery. Sixty-six patients (American Society of Anesthesiologists physical status I and II) scheduled for elective endoscopic sinus surgery were enrolled. There were no significant differences between the two groups with respect to surgical field conditions, blood loss, or extubation time. The sedation score (Modified Observer's Assessment of Alertness/Sedation) in the PACU was significantly lower in the dexmedetomidine group than in the remifentanil group ($p < 0.001$). No differences were found in total blood loss, surgical field conditions, hemodynamic parameters, time to extubation, or pain in the PACU when the two groups were compared ($p > 0.05$).

We found that in group I and group II, mean surgical field score was 2.7 and 2.9, surgical time (mins.) was 64.2 and 62.8, anesthesia time (min) was 84.2 and 79.5, blood loss (ml) was 172.3 and 215.4 and extubation time (min) was 7.4 and 8.2 respectively. We found that there was non- significant difference in MOAA/S score and pain score in both groups at different time intervals (P> 0.05). Hogue et al[12] evaluated the efficacy of remifentanil and propofol total intravenous anesthesia (TIVA) in 161 patients undergoing inpatient surgery. Remifentanil 1 microgram/kg was given intravenously (i.v.) followed by one of two randomized infusion rates: small dose (0.5 micrograms.kg-1.min-1) or large dose (1 microgram.kg-1.min-1). Propofol (0.5-1.0 mg/kg i.v. bolus and 75 micrograms.kg-1.min-1 infusion) and vecuronium were also given. More patients in the small-dose than in the large-dose group responded to tracheal intubation with hypertension and/or tachycardia (25% vs 6%; P = 0.003) but there were no other differences between groups in intraoperative responses. Recovery from anesthesia was within 3-7 min in both groups. The most frequent adverse events were hypotension (systolic blood pressure [BP] < 80 mm Hg or mean BP < 60 mm Hg) during anesthesia induction (10% small-dose versus 15% large-dose group; P = not significant [NS]) and hypotension (27% small-dose versus 30% large-dose group; P = NS), and bradycardia (7% small-dose versus 19% large-dose group; P = NS) during maintenance. In conclusion, when combined with propofol 75 micrograms.kg-1.min-1, remifentanil 1 microgram/kg i.v. as a bolus followed by an infusion of 1.0 microgram.kg-1.min-1 effectively controls responses to tracheal intubation. After tracheal intubation, remifentanil 0.25-4.0 micrograms.kg-1.min-1 effectively controlled intraoperative responses while allowing for rapid emergence from anesthesia.

The shortcoming of the study is small sample size.

CONCLUSION

Authors found that for patients having ESS under general anesthesia, remifentanil and dexmedetomidine can both produce comparable, sufficient degrees of hypotensive anesthesia. Remifentanil-treated patients, however, showed a quicker recovery in the first few days following surgery.

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