Original Research Article

A Comparative Study of Effect of Intraocular Pressure on Insertion of Proseal LMA and Conventional Tracheal Intubation in Paediatric Patients Undergoing Cataract Surgery

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Abstract

Background: Cemented Bipolar hemiarthroplasty thus appears a good option for fracture neck femur in the elderly population. The aim of this study to evaluate the functional outcome and management of intracapsular fracture of neck of femur by cemented bipolar hemiarthroplasty. **Materials & Methods:** A hospital based prospective study done on 20 patients involving intracapsular fracture of neck of femur at department of orthopaedic and indoor at our centre Government Medical College & attached groups of Hospital, Barmer, Rajasthan. The results were classified as excellent, good, fair and poor based on points scored on Harris Hip Score. **Results:** The present study showed that mean age of 69 years. Male to female ratio was 1.85:1. The clinical results were analyzed using the Harris hip score. Most of the patients showed excellent to fair score. Only 1 patient showed poor Harris hip score. Radiological results were excellent (55%) in the current study. There was only 1 case with poor radiological results. There was no case with subluxation or dislocation of the prosthesis. **Conclusion**: We concluded that cemented bipolar hemiarthroplasty seems to be the best way to get good clinical outcomes in elderly patients with fractured femoral neck. Continuous clinical and radiologically testing is essential for the diagnosis of complications.

Keywords: Hemiarthroplasty, Harris Hip Score, Femoral neck, Fracture.

Introduction

Ophthalmic surgery performed under general anesthesia with tracheal intubation may have deleterious effects on intraocular pressure (IOP)[1]. Laryngeal mask airway (LMA) has been found to be superior to tracheal intubation in terms of maintaining stable IOP[2].Studies in children as well as in adults have shown that the introduction of LMA causes less hemodynamic response (lesser increase in IOP) compared to insertion of a tracheal tube (TT)[3-5]. It has been noted that during ophthalmic surgery, control of intraocular pressure (IOP) is clinically important as IOP elevation can cause the transient loss of vision or acute glaucoma[6].Studies have been conducted to compare the IOP in adult patients with the use of I-Gel – CLMA and ETT[7].Although for paediatric group, there is little available literature for the same. Thus, the current study was undertaken.

Objective

To compare the effect of insertion of proseal LMA and conventional tracheal intubation on intraocular pressure in pediatric patients undergoing cataract surgery.

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Materials &Methods

The current study was a hospital based randomized comparative study which was conducted after receiving permission from institutional ethics committee and review board. Written informed consent was taken from guardians of the paediatric patients. Patients with ASA grade I and II and age <14 years of both gender undergoing cataract surgery under GA were included in the study. However, patients who refused, on any medication interfering with IOP, GERD, with anticipated difficult intubation or LMA insertion and ASA grade III, IV & V were excluded from the study.A total of 60 patients were enrolled and divided into two groups of 30 each. All the patients were randomly divided into two groups by chit in box method (Simple Randomization).

Group P: PLMA and Group T: ET

All patients were secured with 22G/24G iv cannula and dextrose 5% was started after arrival in the Operation Theatre. Anaesthesia was induced, following oxygenation with thiopentone till loss of eyelash reflex. Neuromuscular blockade was achieved with Inj. vecuronium 0.08 mg/kg i.v. The induction parameters were noted and when adequate paralysis was achieved, corresponding airway as randomly allocated will be inserted.

In group P, appropriate size PLMA (according to weight) was used. For the purpose of standardization, introducer was used for inserting the PLMA for all cases. In group T, appropriate size endotracheal

intubation was performed by cuffed or uncuffed PVC ET in standard manner. All the patients were maintained on 66% nitrous oxide, 33% oxygen and HALOTHANE 0.5% and manually ventilated using bain's circuit. $EtCO_2$ was maintained between 35 and 45 mmHg. Immediately after placement of PLMA and ET intubation, parameter was recorded. Intraocular pressure and Hemodynamic parameters were recorded at 1,1,1 minute interval after placement of PLMA and intubation. At the end of surgery, anaesthetic agents were discontinued, and patients were kept on 100% oxygen and glycopyrrolate 0.001 mg/Kg followed by i.v. neostigmine 0.05 mg/ Kg for adequate reversal of residual neuromuscular blockade. The patients were observed for one hour post-operatively for any complications.Statistical analyses were done and the difference in proportion was analysed using chi square test and difference in mean were analysed using t Test[7]

Results

No significant difference among group P and group T was observed in cases according to pre induction vital parameters.

Significantly higher difference was observed during pre-insertion among the two groups. However, no significant difference was observed between the two groups during 1 min, 2 min and 3 min time intervals. It was also noted that mean heart rate was higher in group T when compared to group P.No significant difference was observed in Systolic Blood Pressure between two groups during pre-insertion, but significantly higher mean was observed in Group T when compare to group P at 1 min, 2 min and 3 min time intervals.No significant difference was observed in Diastolic Blood Pressure between two groups during pre-insertion, 1 min, 2 min and 3 min time interval.The percentage increase in mean IOP in group T was nearly more than two times when compared with pre induction and pre insertion levels to that group of P. There was increase in percentage of mean SBP at 1 min, 2 min and 3 min pre insertion. Mean arterial pressure also shows increase because it is a function of two variables namely SBP & DBP, later of which is not subject to significant change during sympathetic stimulation.

Table 1: Demographic Data

	Group P (n=30)	Group T (n=30)	Significance
Age (Mean)	7.53	9.20	NS
Gender (M:F)	15.15	16.14	NS
Weight (Mean)	24.80	26.93	NS

Table 2: Pre induction Vital Parameters (Mean ± SD)

	Group P (n=30)	Group T (n=30)	p Value
IOP	13.38 ± 3.29	13.74 ± 3.21	.670
HR	98.57 ± 18.63	93.53 ± 18.66	0.3
SBP	114.13 ± 12.71	116.60 ± 7.81	.369
DBP	75.67 ± 8.77	74.43 ± 6.83	.546
MAP	88.33 ± 9.05	88.60 ± 6.81	.898
$EtCO_2$	28.93 ± 2.10	28.67 ± 1.77	.597
SpO_2	100.00 ± 0.00	100.00 ± 0.00	NA

Table 3: Heart Rate at various time intervals (Mean ± SD)

	Group P n=30	Group T n=30	p Value
Pre insertion	113.70 ± 15.81	98.57 ± 17.69	0.001
1 minute	118.27 ± 13.789	120.73 ± 14.010	0.49
2 minutes	119.50 ± 15.030	121.80 ± 13.770	0.53
3 minutes	119.70 ± 14.714	121.37 ± 13.713	0.65

Table 4: Systolic Blood Pressure at various time intervals (Mean ± SD)

	Group P (n=30)	Group T (n=30)	p Value
Pre insertion	117.93 ± 10.77	118.43 ± 7.93	.839
1 minute	124.63 ± 7.20	135.73 ± 7.04	0.001
2 minutes	122.20 ± 8.25	135.03 ± 6.67	0.001
3 minutes	119.93 ± 6.53	133.60 ± 6.21	0.001

Table 5: Diastolic Blood Pressure at various time intervals (Mean ± SD)

	Group P (n=30)	Group T (n=30)	p Value
Pre insertion	77.07 ± 8.774	76.10 ± 6.499	.628
1 minute	82.47 ± 8.943	83.20 ± 5.255	0.7
2 minutes	79.43 ± 8.504	80.07 ± 4.849	.724
3 minutes	76.83 ± 7.940	79.27 ± 4.792	.156

Table 6: Percentage Increase of various parameters at pre induction levels

		Group P (%)	Group T (%)
Intro ocular pressure	1 min	12.7	38.50
	2 min	7.62	32.45
	3 min	2.46	10.98
Heart Rate	1 min	19.98	29.08
	2 min	21.23	30.22
	3 min	21.43	29.76
Systolic Blood Pressure	1 min	9.20	16.40
	2 min	7.07	15.80
	3 min	5.08	14.37
Mean Arterial Blood Pressure	1 min	9.27	13.66
	2 min	5.25	10.64
	3 min	2.71	9.40

Table 7: Percentage Increase of various parameters at pre insertion levels

		Group P	Group T
Intro ocular pressure	1 min	13.35	34.29
	2 min	8.34	28.44
	3 min	3.08	7.62
Heart Rate	1 min	4.01	22.48
	2 min	5.101	23.56
	3 min	5.27	23.13
Systolic Blood Pressure	1 min	5.68	14.60
	2 min	3.62	14.01
	3 min	1.69	12.80
Mean Arterial Blood Pressure	1 min	6.18	11.7
	2 min	2.27	8.76
	3 min	-0.18	7.54

Discussion

The study was conducted in paediatric patients undergoing cataract surgery under general anaesthesia to clinically evaluate the response of Proseal Laryngeal Mask Airway (PLMA) versus endotracheal tube (ETT) insertion on intraocular pressure. Only few studies have been conducted till date have contributed in this area and hence we conducted the present study. We found comparatively stable hemodynamics to PLMA insertion. A trend of increase in percentages of mean IOP, SBP and heart rate in both groups depicts as association between increased IOP and increased SBP and heart rate.Arterial pressure plays a role in control of IOP. A significant rise in IOP was found in group T, which could be a consequence of greater pressure response to laryngoscope guided tracheal intubation. Directly measured mucosal pressure with PLMA in situ, rarely exceeds 34cm H_2O, implying that mucosal ischaemic injury would be uncommon. During the study we found that although the hemodynamics remained stable after PLMA insertion, there was a significant percentage rise in IOP from the baseline values. The results of the current study were similar to the study conducted by Agrawal et al. (2012)[8]IOP is known to increase after a rise in $PaCO_2$ as a result of choroidal vasodilatation or elevation of CVP or possibly a combination of both the mechanisms. We ensured normocapnia throughout the intraoperative period.We used PLMA for securing the airway of almost all paediatric patients for ophthalmic surgery as it avoids complications like postoperative sore throat commonly associated with endotracheal intubation.We found a significant rise in IOP post PLMA insertion from the baseline values. However, the mean rise in IOP was within the normal range of 10-20 mmHg and hence it was not deleterious to a normal eye but is harmful for patients with hypertension or glaucoma.The limitation of the study is that in our institution the ophthalmologist used the Schiotz tonometer for intraoperative measurements of IOP, and it is not very accurate. Applanation tonometry is the gold standard for measuring IOP.

Conclusion

Thus, it can be concluded that PLMA has an advantage over laryngoscopy-guided tracheal intubation in minimizing the rise in IOP and hemodynamic response in patients with normal baseline IOPs. However, authors suggest exercising caution when using PLMA in patients with glaucoma or hypertension as minimal rise in IOP may prove to be deleterious for their eye. It is also suggested that further studies are required to substantiate the results of the current study in patients with glaucoma and hypertension.

Conflict of Interest: Nil
Source of support:Nil

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