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Original Article

Comparison of No-Touch Extubation with Conventional Awake Extubation in Patients Undergoing Tonsillectomy in General Anesthesia

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ABSTRACT

Objective: To compare frequency of side effects between "no-touch" extubation compared with "awake" tracheal extubation.
Study Design: Quasi-experimental study.
Place and Duration of Study: Department of Anesthesia, Combined Military Hospital, Quetta Pakistan, from Mar to Aug 2023.
Methodology: The study began after gaining ethical approval with sample size approximated through online sample size calculator and randomization done to divide patients into two groups, Group N, which underwent "no-touch" extubation and Group A, which underwent conventional awake extubation. The frequency of adverse reactions was noted with both techniques and data analysis was performed to compute statistical significance where *p*-value ≤0.05 was considered significant.
Results: Group N had fewer side effects at extubation when compared to Group A with coughing found in only 2(6.7%) and bucking in only 3(10%) patients from Group N. Laryngospam, tongue fall, breath holding and emergence delirium was not reported in any of Group N patients but it was present in 3(10%), 7(23.3%), 4(13%) and 3(10%) patients from Group A.
Conclusion: "No-touch" extubation was a better and safer alternative to "awake" extubation in terms of fewer adverse events encountered by patients.

Keywords: Airway Extubation, Anesthesia Recovery Period, Extubation, Laryngismus, Respiratory Aspiration.

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INTRODUCTION

Tracheal extubation can be performed while patients are awake or under deep anesthesia and each approach carries its own drawbacks as "Awake" extubation raises concerns about extubation in a light anesthesia plane, while "Deep" extubation raises questions about leaving the patient with an unprotected airway.[1] Emergence from general anesthesia can lead to agitation, hypertension, and tachycardia[2] with the potential to cause re-bleeding from surgical wound site, increased intra cranial pressure (ICP) and intraocular pressure (IOP) with risk of hypoxemia due to laryngospasm, aspiration, airway obstruction and inadequate ventilatory drive.[3] Local anesthetics or opioids and performing extubation in a deeper plane of anesthesia have been suggested with pre-administering opioids at emergence recommended as they reduce coughing, agitation and hemodynamic response due to their inherent cardiac stability.[4] Unfortunately, in procedures involving the nose and pharynx, the risk of aspiration of blood and secretions is elevated after deep extubation.[5] This concern has led many anesthesiologists to opt for "Awake" extubation technique as it relies primarily on the assessment of the swallowing reflex as a surrogate measure to assess wakefulness of the patient.[6] Nevertheless, it is important to note that patients may be extubated while still in a relatively light plane of anesthesia, as the presence of the swallowing reflex may indicate the restoration of laryngeal reflexes but does not necessarily signify the return of consciousness.[7] The "No-touch" technique has been used to avoid this as extubation is only done when the patient is fully awake and has regained consciousness[8] with stimulation avoided during emergence, like painful central stimuli[9,10] until patient spontaneously opens eyes. Therefore, the rationale of our study is to compare the conventional "Awake" extubation technique to "No-touch" extubation technique to avoid exposure of patients to unnecessary pharmacological agents and adverse events as local literature is scarce on this comparison.

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METHODOLOGY

After receiving approval of Ethics Committee of Combined Military Hospital, Quetta Pakistan, via letter ERC #CMH QTA-IERB/02/2023, this quasi-

experimental study was performed for a duration of six months from May to October 2023. The sample size of our study was calculated using WHO (World Health Organization) sample size calculator, keeping 5% level of significance and 80% power of test, with anticipated population P1 (percentage of patients liable to develop side effects) with "awake" extubation to be 13%[8] and anticipated population P2 (percentage of patients liable to develop side effects) with "no-touch" extubation to be 73%,[8] which gave a sample size of n=10. The patients were enrolled through non-probability consecutive sampling, and we included 30 patients in each group after randomization through sealed envelope, with allocation to either Group A (Awake) or Group N (No-touch). Informed consent was taken from all patients, and they were given a thorough pre-anesthesia assessment.

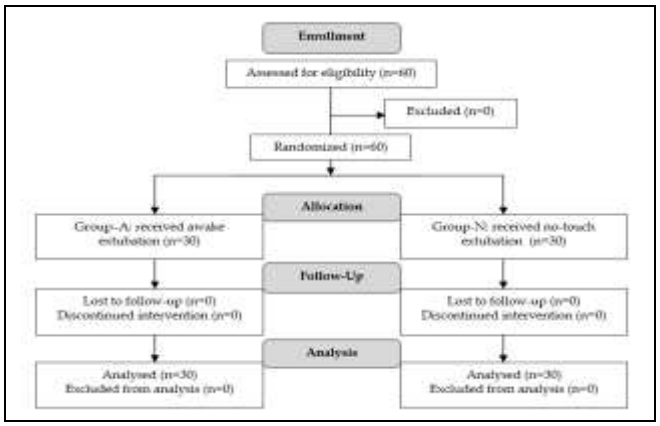

Figure: Patient Flow Diagram (n=60)

Inclusion Criteria: Patients belonging to either gender, who were 15 to 45 years old, with American Society of Anesthesiology physical status classification (ASA)-I and booked through out-patient department (OPD) for elective tonsillectomy were included.

Exclusion Criteria: Pediatric patients, patients with active cardiac condition, asthma, or neuropsychiatric disease and raised intraocular pressure were excluded.

On the day of surgery, all patients were transferred to the operating theatre with standard monitoring (ECG, pulse oximeter, NIBP, and temperature probe) and premedicated with ondansetron (0.15mg/kg), dexamethasone (0.1mg/kg), and nalbuphine (0.1mg/kg) before induction with propofol (2mg/kg) and muscle relaxation with atracurium (0.5mg/kg), followed by intubation with age-appropriate Ring–Adair–Elwyn (RAE) tube tubes and maintenance of anesthesia with isoflurane in 50% oxygen. Group A patients underwent "awake" extubation where isoflurane was discontinued when spontaneous breathing commenced with tidal volumes >3ml/kg, neostigmine (0.08mg/kg) was administered, oropharyngeal suctioning was performed, and patients were stimulated with jaw thrust and trapezius squeeze at 5-minute intervals until they opened their eyes on verbal command before extubation at end-inspiration. In contrast, Group N patients received "no-touch" extubation involving deep oropharyngeal suctioning under deep anesthesia, placement on V-SIMV mode with gradual weaning of mandatory breaths as spontaneous breathing improved, discontinuation of isoflurane without patient stimulation, silent observation until spontaneous eye opening and verbal command compliance, followed by gentle extubation with neostigmine administration to prevent re-curarization. Time from surgery completion to extubation and complications (coughing, bucking, laryngospasm, tongue fall, breath holding, sedation, emergence delirium) were recorded for both groups, with all patients subsequently transferred to post-anesthesia care units with supplemental oxygen. Following demographic parameters were recorded: Age, weight, gender, ASA status, surgical time, time taken for extubation. The presence or absence of adverse reactions was our primary outcome to measure the safety of both techniques, which included coughing, bucking, laryngospasm, tongue fall, breath holding and emergence delirium. Emergence reaction[11] was defined as any disorientation, inconsolability, restlessness and non-purposeful movement at extubation while bucking[12] was defined as aggressive contraction of expiratory muscles. The laryngospasm was labelled when patients uttered crowing sound or there was no bag movement despite adequate airway support.[13] Statistical Package for the Social Sciences (SPSS) version 23 was used for data analysis where Means±SD were calculated for quantitative variables while frequency(%) was computed for qualitative variables. Chi-square test was used to check statistical significance and *p*-value of ≤0.05 was considered significant.

RESULTS

The mean age of the patients in Group A was 20.50±4.918 years while mean age of patients in Group N was 22.60±6.48 years. Surgical time was analogous between the study groups with mean time to be 22.80±4.28 minutes versus 23.53±4.18 minutes in

Group A versus Group N. The extubation time was also similar being 17.77±3.75 versus 17.07±4.21 minutes in Group A versus Group N. In Group A, 17(56.7%) patients were male and 18(60.0%) were female while in Group N, 13(43.3%) patients were male and 12(40.0%) were female. Further demographic characteristics are listed in Table-I.

Table-I: Demographic Characteristics (n=30)

Variable		Group A (n=30) Mean±SD	Group N (n=30) Mean±SD	*p*-value
Age (years)		20.50±4.91	22.60±6.48	0.470
Weight (kilograms)		57.17±6.11	59.53±5.63	0.198
Surgery Time (minutes)		22.80±4.28	23.53±4.18	0.245
Extubation Time (minutes)		17.77±3.75	17.07±4.21	0.806
		n(%)	n(%)	
Gender	Male	17(56.7)	18(60.0)	0.500
	Female	13(43.3)	12(40.0)	
ASA Class	I	17(56.7)	18(60.0)	0.500
	II	13(43.3)	12(40.0)	

**ASA: American Society of Anesthesiology*

Group N had fewer side effects at extubation as compared to Group A with frequency and significance of all adverse events listed in Table-II.

Table-II: Frequency of Adverse Events at Extubation (n=30)

Adverse Event		Group A (n=30) n(%)	Group N (n=30) n(%)	*p*-value
Coughing	Yes	8(26.70)	2(6.7)	0.04
	No	22(73.3)	28(93.3)	
Bucking	Yes	10(33.3)	3(10)	0.029
	No	20(66.7)	27(90.0)	
Laryngospasm	Yes	3(10)	0(0)	0.05
	No	27(90.0)	30(100)	
Tongue Fall	Yes	7(23.3)	0(0)	0.005
	No	23(76.7)	30(100)	
Breath Holding	Yes	4(13.3)	0(0)	0.002
	No	26(86.7)	30(100)	
Emergence Delirium	Yes	3(10)	0(0)	0.119
	No	27(90.0)	30(100)	

DISCUSSION

Exaggerated laryngeal reflexes can lead to respiratory complications including bucking, coughing, breath holding, laryngospasm and may more. These pulmonary responses can potentially trigger changes in arterial, intraocular and intracranial pressures which may have detrimental consequences. Smooth extubation techniques are aimed at mitigating these physiologic responses with no touch extubation, being one of smooth extubation techniques, which can avoid use of adjunct maneuvers and pharmacological agents and can help in smooth emergence as there are essentially three extubation techniques to aid smooth extubation including exchange of supra-glottic airway device for endotracheal tube, deep extubation and no touch extubation, however no consensus exits on which technique performs better[15]. One study used this technique for extubation in patients undergoing tonsillectomies, where they observed that there was a marked decrease in incidence of complications by using desflurane, however, we used isoflurane[16]. In another study, no touch maneuver was used as part of deep extubation technique where, when patients started making adequate tidal volumes, the trachea was extubated deep and patients were turned to lateral position with gentle oropharyngeal suctioning similar to our study, where we did deep suctioning when patient was deeply anesthetized and no arousal attempt was made, as their patient group was post-ophthalmic surgery, we studied this technique in tonsillectomy patients as this is relatively a novel technique and literature is scarce due to which we deliberately avoided high risk group for our research[17]. The use of no touch extubation in clinical practice is hindered by certain factors like pressing need of quick extubation by surgeons due to which anesthetists may perform stimulation to show surgeons that patient is being awakened despite the fact that emergence time would not reduce with these maneuvers and hasty extubation can have detrimental consequences, so no touch extubation under these circumstances seems a safer choice and avoids panic in operating room at time of extubation[18]. In one study, the quality of emergence during extubation in an experimental study was better in no touch extubation technique[19].

LIMITATIONS OF STUDY

This study has several limitations that should be considered when interpreting the results. The quasi-experimental design may introduce selection bias and confounding variables compared to a randomized controlled trial. The single centre setting at a tertiary hospital limits generalizability to other healthcare contexts and populations. The inability to blind healthcare providers and outcome assessors, potentially introduced observer bias, while the focus on immediate post-extubation events excludes assessment of patient satisfaction, recovery time, or delayed complications.

CONCLUSION

No-touch extubation was found to be safer than awake extubation in terms of fewer adverse events for patients.

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Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

MR & AR: Data acquisition, data analysis, critical review, approval of the final version to be published.

CAA & KSA: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

SQ & KM: Conception, data acquisition, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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