Investigation of the relationship between age and weight with Postoperative Myalgia Following Succinylcholine Administration: a cross sectional

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ABSTRACT

One of the issues that is thought to occur frequently following surgery that uses succinylcholine as part of the anaesthesia protocol is post-operative myalgia. The patient may experience a somewhat unsatisfactory outcome following surgery as a result of this complication. In the meantime, studies on the incidence and avoidance of post-operative myalgia following succinylcholine administration were conducted. There was a dearth of information and research on this topic in Iraq. Our study's goal is to investigate the connection between weight and age and postoperative myalgia after succinylcholine administration.

In the months of September and October of 2022, a sample of patients from two hospitals in the city of Karbala was collected. After collecting data on myalgia scores 6-, 12-, and 24-hours following surgery, the data was analysed, and the significant value was determined to be $p<0.05$.

In our population, female patients made up the largest percentage (approximately 65.5%), while male patients made up only 34.5% of the sample. Less than 1% of patients reported being pain-free six hours after the procedure, whereas almost all patients had myalgia. The percentage of patients who had mild myalgia was 47.4%, or about half. Furthermore, moderate pain was reported by 43.3% of them. Just 8.2% of patients reported being in excruciating pain. Age and muscle pain have an inverse relationship, according to all time interval pain assessment ($P<0.05$). We found no evidence of a significant relationship between the patient's weight category increasing and muscle pain after six, twelve, or twenty-four hours.

Lastly, we have determined that post-operative myalgia caused by succinylcholine is common in the Iraqi population and affects most patients across a range of age groups. Generally speaking, the severity of muscle pain decreases with age. Neither the patient's weight nor the amount of succinylcholine had an impact on the outcome of myalgia..

Introduction

In order to help patients relax before endotracheal intubation, whether for emergency situations or before specific surgeries and procedures, a variety of anaesthesia medications are used. Medications that cause nerve block, patient relaxation, sleep, or loss of motor and sensory activity are commonly used to administer anaesthesia. These drugs are divided into multiple groups and can be given intravenously, orally, or through inhalation. One of the most widely used anaesthetic drugs, succinylcholine is favoured as a muscle relaxant for rapid sequence intubation because of its quick onset and brief duration of action(Hoshi et al., 2011).

The World Health Organization's List of Essential Medicines includes succinylcholine chloride, also referred to as suxamethonium chloride, as a depolarising neuromuscular blocking agent (NMBA) (Alvarellos et al., 2015a). It is useful in surgeries and medical procedures that call for temporary skeletal muscle paralysis because of its quick onset and brief half-life(Alvarellos et al., 2015a).

When patients are not sufficiently prepared for intubation, succinylcholine is used for rapid-onset intubation to reduce the risk of pulmonary aspiration. In cases where patients are not NPO (nothing per mouth), as well as in cases of achalasia, gastric reflux, paralytic ileus, and acute trauma necessitating immediate surgery, it is used in conjunction with other neuromuscular blocking agents like rocuronium(Perry et al., 2003).

An induction agent, such as propofol or etomidate, should be administered prior to the administration of neuromuscular blocking agents in order to expedite the intubation process and induce unconsciousness. 1 mg/kg IV is the ideal succinylcholine dosage, which enables intubation in 30 to 60 seconds. After five to ten minutes, its effects usually subside(Alvarellos et al., 2015b).

Succinylcholine is contraindicated in cases of laryngeal injury or anticipated difficulty intubation, as well as in patients who may be at risk for hyperkalaemia due to severe abdominal sepsis, severe spinal cord injury, or severe burns(Schreiber et al., 2005).

Side effects from neuromuscular blockers, and succinylcholine specifically, include myalgia, hyperkalaemia, and hyperheat. After succinylcholine is administered, myalgia is frequently experienced and may last for a few days. Myalgia is frequently linked to elevated blood levels of free radicals, free fatty acids, myoplasmic calcium, and the breakdown of membrane phospholipids, although the exact pathophysiology of muscle pain is unknown. Women are more likely to experience post-succinylcholine myalgia, which usually doesn't need hospitalization (Sane et al., 2020).

Due to succinylcholine's significance and effectiveness in producing rapid onset sedation, numerous studies have attempted to prevent muscular complications following its use. Numerous studies have looked at how pre-administration drugs can mitigate succinylcholine's side effect of muscle pain. Numerous sedatives, corticosteroids, and anti-inflammatory drugs have been tried with differing degrees of success (Schreiber et al., 2003a). The purpose of our research is to examine the connection between postoperative myalgia after succinylcholine administration and age and weight.

Method and Materials:

Patients who received succinylcholine during surgery in two private hospitals in Karbala city during the two-month period of September and October 2022 were the subjects of this quantitative cross-sectional study. We gathered data prospectively over the course of two months for our study, including information on risk factors prior to surgery and myalgia as a post-operative complication. In the field (hospital), patients were asked to fill in a questionnaire assessing their myalgia six, twelve, and twenty-four hours after the surgery. The questionnaire

was based on a pain scale with four levels: none indicated no pain, mild indicated low-intensity pain, moderate indicated average-intensity pain, and severe indicated high-intensity pain that interfered with the patient's ability to move.

Both the patient file and the patient interview provided the variable. The patient or one of his family members or carers provided information based on the patient's physical and mental capabilities. To prevent bias, the patient should be at least 6 hours away from their surgery when we perform our initial assessment. A follow-up assessment is conducted 12 hours later, and the final assessment is conducted 24 hours later. We begin by confirming the patient's name and age, introducing ourselves as University of Tehran Master's program students, and then outlining the purpose of the questions. These include:

Predictors included the patient's condition, the circumstances surrounding the surgery, and the patient's prior medical history in the medical file. Our attention was directed towards the risk factors that are typically associated with potential post-operative complications. These risk factors include cancer, diabetes or other endocrinology diseases, hypertension, heart failure, pulmonary disease, renal failure or insufficiency, prior cerebrovascular accidents, and heart failure.

Age, smoking, and alcoholism are risk factors that are obtained from the patient's medical file or questionnaire and are unrelated to their prior medical history.

200 patients had their data collected; following data cleaning for missing questionnaires or lost patient communications, a sample size of 194 patients remained for analysis. Individuals without a history of succinylcholine use as an anaesthetic or those with known serious health risks (such as heart or renal failure) were not included. whereas the inclusion criteria applied to patients who had acceptable health conditions and had received succinylcholine. The statistical program IBM SPSS Statistics 22 was used to analyse the data (SPSS Inc., Chicago, US). P values of less than.05 in some tests and less than.01 in others were deemed statistically significant. The margin of error is 5%, and the confidence interval is 95%.

The variables were described using descriptive statistics like means, frequencies, and standard deviations. Next, we looked at factor analysis and Cronbach's alpha coefficient to determine the scales' internal consistency. Using cross-tabulation, we investigated correlations between input and output variables. To ascertain the correlation between the qualitative variables as well, Spearman's correlation test was employed.

Findings:

Regarding gender variables, only 34.5% of the sample consisted of male patients, whereas female patients made up the largest percentage of our population, accounting for around 65.5%. We were able to successfully adhere to our inclusion criteria with regard to comorbidities. With a percentage of 74.7%, the majority of the population had no comorbidities. Patients with hypertension came in second with a percentage of 17%, and the other two groups were almost equal, with 3.9 percent of patients having diabetes and 4.1% of patients having both diabetes and hypertension as risk factors. We observed that our population was widely distributed across various surgical procedures. With a rate of 43.3%, we can conclude that caesarean sections are the most frequently reported surgical procedure for our patients. Following ureterostomy, inguinal hernia, and hip replacement procedures, the type of surgery was a variable to shed light on the health status of our population at the time of data collection, but it had little bearing on the goals of our study. The data frequencies also showed that the majority of our population does not

smoke, primarily because of the prevalence of women in an Iraqi community that does not accept female smokers. Eighty-four percent of the population did not smoke, while only 19.6% did.
It was evident in our population that Iraqi patients were prone to pots-operative myalgia caused by succinylcholine (table 1). According to the information gathered from the patient interviews, almost all of the patients had myalgia six hours after the surgery, with less than 1% reporting no pain. The percentage of patients who had mild myalgia was 47.4%, or about half. Furthermore, moderate pain was reported by 43.3% of them. Just 8.2% of patients reported being in excruciating pain. According to data collected 12 hours after surgery, the majority of patients reported only mild pain, with a percentage of about 70.6%. Moderate pain was reported by 26.3% of the patients. Only around 1% of people reported experiencing severe pain. We discovered that the good outcome, which is "none" or the absence of pain, is more prevalent than other time interval variables in the 24-hour time interval category following surgery. In 24.7% of the sample, none are reported. Seventy-one percent still present with mild pain. Additionally, 5.2% of the sample reported having moderate pain. It should be noted that there were no patients in excruciating pain 24 hours following surgery.
The largest percentage of our population—roughly 36.6%—did not require a painkiller medication to treat post-operative myalgia. Subsequently, simple oral or intravenous acetaminophen or paracetamol accounted for 41.2% of the most commonly used medications. Diclofenac was the next most popular pain reliever, with a 13.9% usage rate. Lastly, 8.2% of cases involved the use of tramadol.
This statistical result illustrates the patients' reaction to receiving a particular class of painkillers after experiencing muscle pain. Although we generally observed an improvement in the perception of pain, the patients who reported partial relief had the highest percentage (64.4%). Of the patients, 35.6% reported total pain relief.

Although the correlation is weak, it is significant, and we can infer that as age rises, muscular pain will decrease. We observed a moderately significant negative correlation between the age category and muscular pain after six hours. After 12 hours, we observed a somewhat significant inverse relationship between an increase in age category and muscle pain. Moreover, there was a marginally significant inverse relationship between age group increases and muscle pain 24 hours later. Therefore, there is an inverse relationship between age and muscle pain across all time interval pain assessments.
When examining the patient's weight in conjunction with their myalgia score, we found no discernible relationship between an increase in the patient's weight category and muscular pain at 6, 12, or 24 hours. This finding may result in the lack of a correlation between the patient's weight—whether underweight, normal weight, overweight, or obese—and the myalgia that succinylcholine causes after surgery. the correlation between the patient's myalgia score at the 3-time interval and the succinylcholine dosage, which is measured in milligrammes per kilogramme of the patient's weight. Because of the weak correlation coefficients in the statistical tests conducted on 6- and 12-hour intervals, as well as the lack of significance at 24-hour intervals, the results did not sufficiently assist us in this section. Lastly, we examined the relationship between the patient's gender and the 12-hour muscle pain score at the cross-tabulation level. and observed that these two variables had a moderately significant correlation (table 2).

Discussion and Conclusion:

Studying post-operative myalgia is critical as the prevalence of this kind of complication is growing for the population that needs rapid onset intubation. At the end of our research, different important conclusions can be derived and then linked to the research question and hypothesis that was initiated at the early beginning of our research. One of the objectives of this study was to assess the situation among Iraqi patients. A sample taken from 2 Iraqi hospitals in the Karbala city area reflects the actual situation among the Iraqi population. In general, we clearly can conclude that post-operative myalgia when using succinylcholine is significant among our population since the pain assessment done on patients showed that the majority of them experienced muscular pain in different locations.

We categorized the sample's patients into underweight, normal weight, overweight, and obese groups based on their BMI; however, we did not find a significant correlation between weight category and post-operative myalgia in a patient who received succinylcholine. We also examined the impact of high succinylcholine dosage and if it could raise the incidence of succinylcholine-induced post-operative myalgia; however, no meaningful conclusions were drawn from the data analysis at this level. Accordingly, data analysis supported our main hypothesis, which is that post-operative myalgia is a common consequence of anesthetic therapy. Such research is typically necessary for evidence-based medicine in particular and evidence-based practice in general to update their practices and raise the standard of treatment.

Conclusion:

Lastly, we have determined that post-operative myalgia caused by succinylcholine is common in the Iraqi community and affects most patients across a range of age groups. Generally speaking, the severity of muscle discomfort decreases with age. Neither the patient's weight nor the succinylcholine dosage had an impact on the myalgia result.

What we can do in the future is research supported by the ministry of health and the syndicate of hospitals that encompasses a larger population, larger sample size, and more hospitals and may include additional variables to be studied. Experimental or interventional research can be done also to try to prove certain techniques to be practiced in this domain.

Author Contribution:

Every author satisfies the requirements for authorship, and everyone who is eligible is listed as an author. Final article approval, ideation, gathering of data, formal analysis, and creation of the manuscript draft: All authors; ASH reviewed and edited the manuscript..

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Conflict of Interest:

There is no conflict of interest in the present study.

Table1: the patients experienced of pain after the surgery

hours / Pain	After 6hours		After 12 hours		After 24 hours	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
None	2	1.0	4	2.1	48	24.7
Mild	92	47.4	137	70.6	136	70.1
Moderate	84	43.3	51	26.3	10	5.2
Severe	16	8.2	2	1.0	0	0.0

Table2: correlation between age and muscular pain after 6,12 and 24 hours after surgery

	Age Categories	Pain scale after 6 hours:	Pain scale after 12 hours	Pain scale after 24 hours:
Correlation Coefficient	1.000	-.469**	-.261**	-.189**
Sig. (2-tailed)	.	.000	.000	.008
N	194	194	194	194

Table3: correlation between weight and muscular pain after 6,12 and 24 hours after surgery

	weight Categories	Pain scale after 6 hours:	Pain scale after 12 hours	Pain scale after 24 hours:
Correlation Coefficient	1.000	.050	.027	.085
Sig. (2-tailed)	.	.492	.713	.240
N	194	194	194	194

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