

# Evaluation of the most Muscle Relaxants in Surgical Operations, in the Opinion of Anesthesiologists in Misurata Hospitals

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الملخص:

المقدمة: مرخيات العضلات تُعطي عوامل الحجب العصبي العضلي أو مرخيات العضلات، وذلك لتسهيل التنبيب والتعرض الجراحي ومنع حركة المريض خلال فترات التحفيز العالي.

أهداف الدراسة: الغرض من هذه الدراسة هو تقييم أكثر أنواع إرخاء العضلات في العمليات الجراحية وتحديد أسباب اختيار مرخيات العضلات هذه على نطاق أوسع.

المنهجية: إجمالي أطباء التخدير الذين تم استهدافهم في هذه الدراسة داخل مستشفيات مختلفة في مدينة مصراتة (مستشفيات عامة وخاصة) هو 43. تم توزيع الاستبيانات على أطباء التخدير في عام 2022.

النتائج: نلاحظ في هذه الدراسة أن الدواء الأكثر استخداماً للعمر (0-2 سنوات) هو Esmeron يليه Scoline. علاوة على ذلك، فإن معظم أسباب استخدام Esmeron هو سلامته على المريض، بينما يرجع سبب اختيار scoline كاختيار ثاني إلى خطر إصابة الأطفال بالاعتلال العضلي الذي لم يتم اكتشافه جيداً. الأدوية المهدئة للعضلات المستخدمة مع (2-6 سنوات) هي Esmeron يليها Scoline، ومن أهم أسباب اختيار Esmeron أمانه وتوفره للمريض. أما أسباب اختيار scoline فهي بسبب تأثيره السريع وقلة إفرازه للهيستامين. بالإضافة إلى ذلك، تشير النتائج إلى أنه في حالة المرضى الذين تتراوح أعمارهم بين (6-15 عاماً)، فإن أفضل مرخٍ للعضلات هو Esmerone، يليه Scoline. والأسباب الأكثر شيوعاً لاستخدام Esmeron هي بسبب أمانه وتوفره، وهو أكثر مرخيات العضلات استخداماً. ومن ناحية أخرى، فإن سبب اختيار scoline هو (لم يتم اكتشاف خطر إصابة الأطفال بالاعتلال العضلي جيداً). في حالة المرضى الذين تتراوح أعمارهم بين (15-40 سنة)، يعتبر Esmeron أكثر مرخيات العضلات استخداماً لعدة أسباب، أهمها توفره وأمانه على المريض. scoline، بسبب مدته القصيرة وقلة إفراز الهيستامين. بينما مع المرضى الذين تتراوح أعمارهم بين (40-60 سنة أو أكثر)، يعتبر Esmeron أكثر مرخيات العضلات استخداماً لعدة أسباب، أهمها توفره وسلامته على المريض. وهناك أيضاً أدوية أخرى، وهي Scoline و Cisatracurium و Atracrium.

الخلاصة: نستنتج أيضاً أن غالبية المستهدفين اتفقوا على أن Esmeron سيكون الخيار الأول بنسبة 28.91، و scoline كخيار ثانٍ بنسبة 21.88٪، بينما Atracrium في المركز الأخير كخيار ثالث.

## Abstract

Introduction : Muscle Relaxants Neuromuscular blocking drugs, or muscle relaxants, are administered to facilitate intubation, surgical operation and prevent patient movement through periods of high stimulation of the patient.

**Aims of study:** The purpose of the present study is to evaluation of the most muscle relaxant in surgical operations and determine the reasons for choosing these muscle relaxants more widely than others choose.

**Methodology:** There were total of anesthesiologists. The respondents were worked in different hospitals in Misurata (public and private hospitals). Questionnaires were distributed to anesthesiologists in 2022 .

**Results :**the most commonly used and common muscle relaxant in the operating room at Misurata Hospitals is Esmeron. Half of the target 50% attributed the reason for choosing a particular type of muscle relaxant drug as the first choice to both the availability and medical reason, and do not for one reason without the other. We note that the most used drug for age (0-2 years) is Esmeron followed by Scoline. Moreover, that the most reasons for using Esmeron is for its safety on the patient, while Scoline is due to the pediatric risk of myopathy not discovered well. The muscle relaxant drugs used with (2-6 years), are Esmeron, followed by Scoline, and one of the most important reasons for choosing Esmeron is its safety and availability for the patient. As for the reasons for choosing Scoline, it is because of its rapid effect and its less of histamine release. In addition, the results indicate that, in the case of patients aged (>6-15 years), the best muscle relaxant is Esmerone, followed by Scoline. The most common reasons for using Esmeron is its safety and availability, and it is the most widely used muscle relaxant. On the other hand, the reason for choosing Scoline is RSI (pediatric risk of myopathy not discovered well). In the case of patients aged (>15-40 years), Esmeron is the most widely used muscle relaxant for several reasons, the most important of which is its availability and safety for the patient. Scoline, due to its short duration and less histamine release. While with patients aged (>40-60 years or more), Esmeron is the most widely used muscle relaxant for several reasons, the most important of which is its availability and safety for the patient. There are also other medicines, which are Scoline, Cisatracurium and Atracrium.

**Conclusion :** The researcher concludes that the majority of the target audience agreed that Esmeron would be the first choice with a percentage of 28.91, and Scholine as the second choice with a percentage of 21.88%, while Atracruim came in the last place as the third choice. While Atracruim came in the last place as the third choice.

### **Introduction:**

Muscle Relaxants Neuromuscular blocking drugs, or muscle relaxants, are administered to facilitate intubation and surgical operation and prevent patient movement through phases of high stimulation of the patient. It is essential to halt neuromuscular blockade before cessation of general anesthesia because otherwise the patient would be conscious but paralyzed, causing in extreme dysphoria (Cohn L and Edmunds L, 2003). Neuromuscular blocking drugs were first used in anesthesia and surgical operation in 1942, ushering in a new era (Chhaya S, etal., 2022). Thesleff and Foldes and associates first presented succinylcholine, a depolarizing muscle relaxant drug, in 1952, and it rapidly became commonly used due to the medicine's fast action and ultra-short duration of act, which allowed fast endotracheal intubation and fast restoration of neuromuscular strength. Even so, in addition to fasciculations, scholine also causes many unwanted effects, including masseter spasm, malignant fever in patients with pseudocholinesterase deficiency, slow heart rate, dysrhythmias, raised potassium release, postoperative myalgia, raised intracranial, intraocular, and intragastric pressure (Ghorbanlo M, 2016). Regarding the risk–benefit ratio relative to the usage of muscle relaxant drugs, the

professionals confirmed us that, for more than 30 years now, all researches investigating intra-operative allergic accidents in France have been pointing in the same direction. Muscle relaxant drugs have been participate in more than half of these accidents (Tran D, et al., 2015). The most significant part of the anesthetic drugs are muscle relaxant medicines.

Uses:

- Assist the endotracheal intubation procedures.
- Assist in surgical operation by preventing the patient's movement.
- Assist the mechanical ventilation procedures, whether in surgical operation or intensive care.

There are two kinds of muscle relaxant drugs, depending on their mechanism of action:

1- Non-polar muscle relaxant drugs (competition):

They act to compete with the acetylcholine at the cholinergic receptors and thus prevent the ACh from binding with the receptors at the neuromuscular end, preventing contraction.

- Pancuronium, known as (Pavlon), is classified by being long-acting (it continues about 40 to 60 minutes) and slow-acting and is given at a dose of 0.04-0.1 mg / kg intravenously ... As for its effects (slow or rise in pulse and pressure. It also causes an raise in excretion) and is available as a 1 mg/ml solution

- Vecuronium, known as Norcuron, is faster than Pavlon (it continues for 35-40 minutes) and is given at a dose of 0.08-0.1 mg/kg intravenously... It is available as a powerhouse of 10 mg and 20 mg.

- Rocuronium is known as Esmeron, and it is characterized by its fast action compared to other drugs, and it continues about 30 minutes, so it is used in the case of quick sequence induction at a dose of 1.2 mg / kg. The initial dose is 0.4-0.6 mg / kg intravenously. Moreover, its effects cause vagal blockade due to an raised in HR pulse with a slight raised in pressure, and it is considered safe for patients with asthma, because it does not cause the release of histamine. Available in 10 mg/ml.

- Atracurium, a muscle relaxant drug that one of the non-depolarizing relaxant class and is a member of the benzylisoquinolinium medicine family, has been a common initial option for individuals with renal and hepatic failure because of its independent metabolism from these main body organs. It has been engineered to spontaneously degrade at pH levels and physiological temperatures using a practice known as Hoffman elimination, producing the metabolites laudanosine (a tertiary amine) and monoquaternary acrylate. Atracurium can also undergo ester hydrolysis. Hofmann elimination is an entirely chemical procedure that causes molecular fragmentation to a monoquaternary acrylate and laudanosine, resulting in the elimination of positive charges. Laudanosine is cleared by the liver but quickly penetrates the blood-brain barrier and has qualities that stimulate the central nervous system (CNS). Atracurium administration can cause hemodynamic changes that might be problematic, especially for cardiovascular diseases. These changes are brought on by the release of histamine (Chhaya S, et al., 2022).

2- Polarizing muscle relaxant drugs: they act as receptor agonists for nicotinic receptors, causing a period of muscle contraction followed by relaxation. For example:

- Succinylcholine known as Suxamethonium and is commercially called scholine. It is an acetylcholine receptor agonist, is a depolarizing muscle relaxant that contains of two acetylcholine molecules joined together by a carbon bond. It is the only depolarizing muscle relaxant drug presently used. Although the initial effect of scholine is neuromuscular activation, the agent's duration desensitizes the acetylcholine receptor resulting in relaxation. Scholine has a short duration of action (5–15 minutes) and the fastest onset (60–90 seconds) of all the muscle relaxant drugs. The most important drawbacks to use of scholine are hyperkalemia and like volatile anesthetics, the risk of malignant fever (Wappler F, 2001). This hyperkalemia is a concern in patients with high baseline levels and in patients suffering from burns, spinal cord injury, massive trauma, prolonged ICU stay. Because this medicine is metabolized by endogenous cholinesterase enzyme, low levels of cholinesterase or abnormal cholinesterase will cause a prolongation of the duration of the paralytic effects of this medicine (Cohn L and Edmunds L, 2003). Since the advent of scholine, the emphasis of neuromuscular blockade medicine development has been to develop a neuromuscular blocker with the pharmacokinetics of scholine without the side effects that accompany its use. The newer neuromuscular blocking medicines such as vecuronium and cis-atracurium are nondepolarizing drugs that are competitive antagonists of acetylcholine at the nicotinic acetylcholine receptor at the motor end plate. There are wide changes of nondepolarizing muscle relaxant drugs on today's market. Cisatracurium has about three times the potency of atracurium besylate when it comes to neuromuscular blockade. Cisatracurium's is 50 µg/kg while atracurium's ED95 is 0.2 mg/kg. The important advantage of cisatracurium over atracurium and other histamine-releasing neuromuscular blocking medicines is that it does not produce histamine, which enhances cardiovascular stability (Chhaya S, et al., 2022).

Features of neuromuscular-blocking medicines :

| Drug            | Dose (mg/kg) | Onset (min) | Duration (min) | Effect on HR | Effects on BP | Effects on CO | Renal Elimination |
|-----------------|--------------|-------------|----------------|--------------|---------------|---------------|-------------------|
| Succinylcholine | 1.5          | 1–1.5       | 5–15           | +            | +             | 0             | 0%                |
| Pancuronium     | 0.1          | 3–5         | 180–240        | ++           | +             | +             | 70%               |
| Vecuronium      | 0.1          | 2–3         | 75–120         | 0            | 0             | 0             | 15%               |
| Cis-atracurium  | 0.2          | 2–3         | 60–90          | 0            | 0             | 0             | <5%               |
| Doxicurium      | 0.06         | 3–5         | 180–240        | 0            | 0             | 0             | 75%               |
| Rocuronium      | 0.6          | 1–2         | 45–90          | 0            | 0             | 0             | 0%                |
| Mivacurium      | 0.2          | 2–3         | 15–40          | 0            | 0             | 0             | <5%               |

### Methods:

This research utilized the descriptive research design to describe and summarize data. It was used in profiling and characterization of the respondents and their responses. This was employed to produce accurate description of the variables under study. According to Polit and Hungler(2004), quantitative description involves the prevalence, incidence, size and measurable attributes of a phenomenon. Descriptive studies assist the researcher to discover new meaning describing what exists, determining the frequency with which something occurs and

categorizing information (Burns and Grove, 1999). The researcher utilized the descriptive design to understand the most common used intravenous anesthetic drugs for induction of general anesthesia.

Fields of study:

- Spatial domain :

The spatial scope of the current study is determined in the city of Misurata, where the study was conducted in Misurata hospitals..

- Human field:

The human field of study was determined on a stratified random sample of Misurata hospitals Anesthesiologists, and the sample was randomly selected Anesthesiologists; the study sample consisted of 43 Anesthesiologists of both sexes.

- Research instrument:

The research instrument used in the study was a survey questionnaire and interview with Anesthesiologists.

Data gathering procedure:

The researchers secured all necessary permission from concerned authorities in the conduct of the study. The data for this study were collected by Fill out questionnaires for a group of Anesthesiologists in Misurata hospitals.

Statistical treatment and data analysis:

The data gathered were classified, tabulated and analyzed. The researcher used frequency, percentage distribution and relationship as statistical tool. Such tool shows the number of observations falling in each range or the percentage observations. It is used to find out the incidence of most common used muscle relaxant drugs in surgical operation in Misurata hospitals. Tables and charts were also used to describe the information gathered from the research study.

Search criteria and location:

- The respondent should be the anesthesiologist within the Misurata hospitals.

## Results:

The study focused on the the most muscle relaxants in surgical operations in the opinion of anesthesiologists in Misurata hospitals. Frequency, percentage and weighted mean were used as statistical treatments. The results guided the researcher in making recommendations, find out the most muscle relaxants in surgical operations in the opinion of anesthesiologists in Misurata hospitals. The information gathered from the participants is presented in the form of tables and charts. the questionnaire consist of two parts, part I addressed the profile variables of the respondents, and part II consist of The muscle relaxants used in general anesthesia in Misurata hospitals.

Profile of the respondents:

The job level:

Table No. (1) Distribution of the study sample by job level.

|                            | Frequency | Percent |
|----------------------------|-----------|---------|
| 3 <sup>rd</sup> doctor     | 13        | 30.2    |
| 1 <sup>st</sup> doctor     | 11        | 25.6    |
| 1 <sup>st</sup> specialist | 8         | 18.6    |
| 2 <sup>nd</sup> doctor     | 6         | 14.0    |
| 2 <sup>nd</sup> specialist | 3         | 7.0     |
| professor                  | 2         | 4.7     |
| Total                      | 43        | 100.0   |

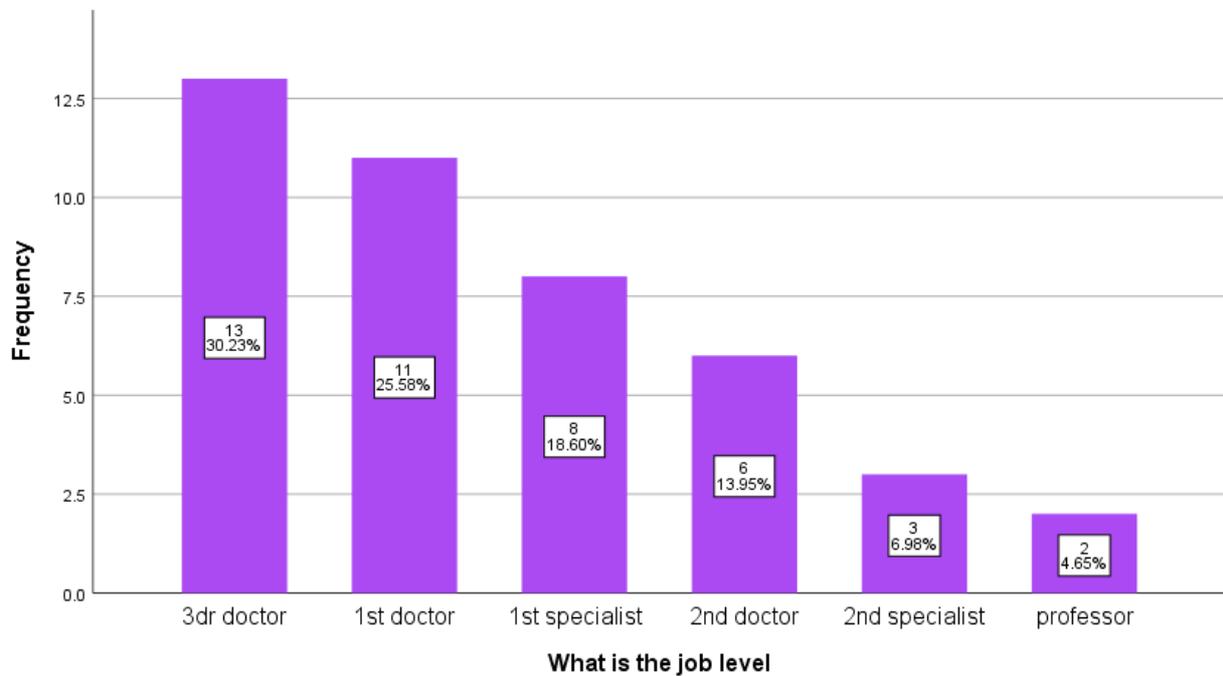


Figure No. (1) Distribution of the study sample by job level.

It is noted from table (1) and figure (1) that 3<sup>rd</sup> doctor amounted to 30.2% and the highest percentage, while 1<sup>st</sup> doctor reached 25.6 % followed by 1<sup>st</sup> specialist at 18.6% then 2<sup>nd</sup> doctor at 14%, then a percentage of 2<sup>nd</sup> specialist 47% and finally with a percentage of professor 14.7% which represents the lowest percentage. And through these results, we find that the vast majority of those targeted were a 3<sup>rd</sup> doctor with a percentage of 30.2%. While the lowest category of the target group was a professor with a percentage of 4.7%.

**The place of work**

Table No. (2) Distribution of the study sample by place of work.

|       |         | Frequency | Percent |
|-------|---------|-----------|---------|
| Valid | private | 10        | 24.4    |
|       | public  | 28        | 68.3    |
|       | Both    | 3         | 7.3     |
|       | Total   | 41        | 100.0   |

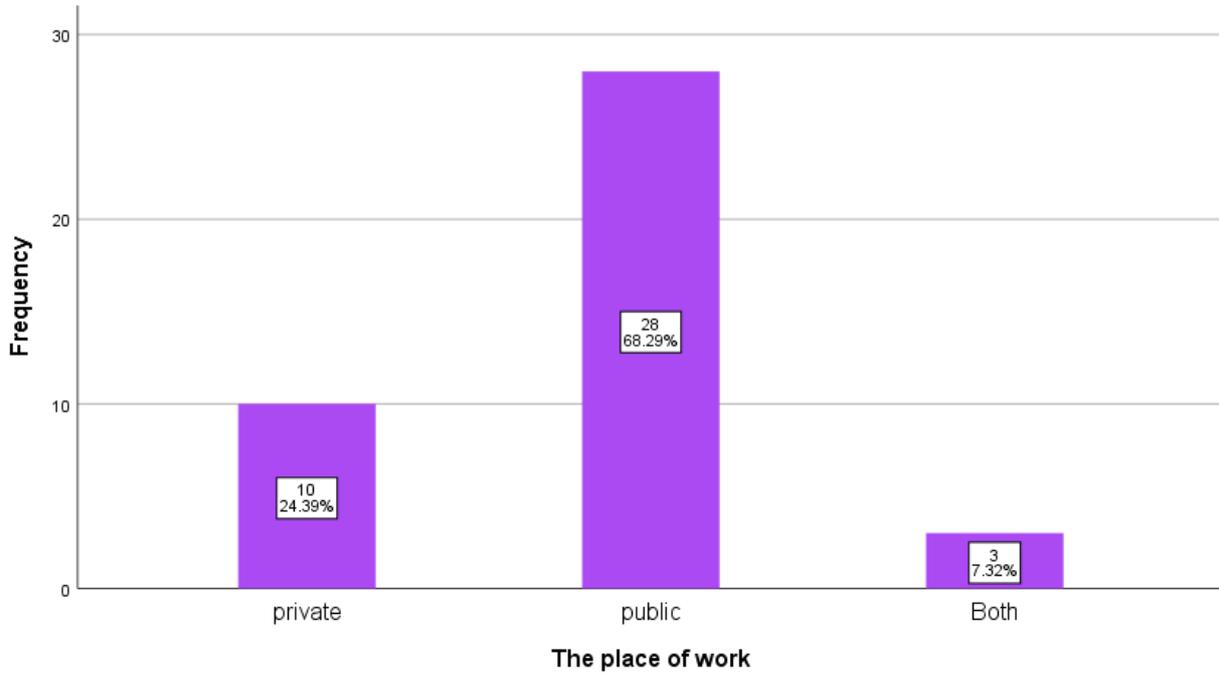


Figure No. (2) Distribution of the study sample by place of work.

It is noted from Table (2) and figure (2) that public place of work reached 68.3% which is the highest percentage, while private place of work reached 24.4%. Finally, both place of work a percentage of 17.3 that is the lowest percentage. Through these statistics, we conclude that the vast majority of those targeted were working in public hospitals only, at a rate of 68.3%. While a very small group of anesthesiologists targeted, whose percentage does not exceed 73%, are those who work in both public and private hospitals.

The List three muscle relaxants in order of the most frequently used

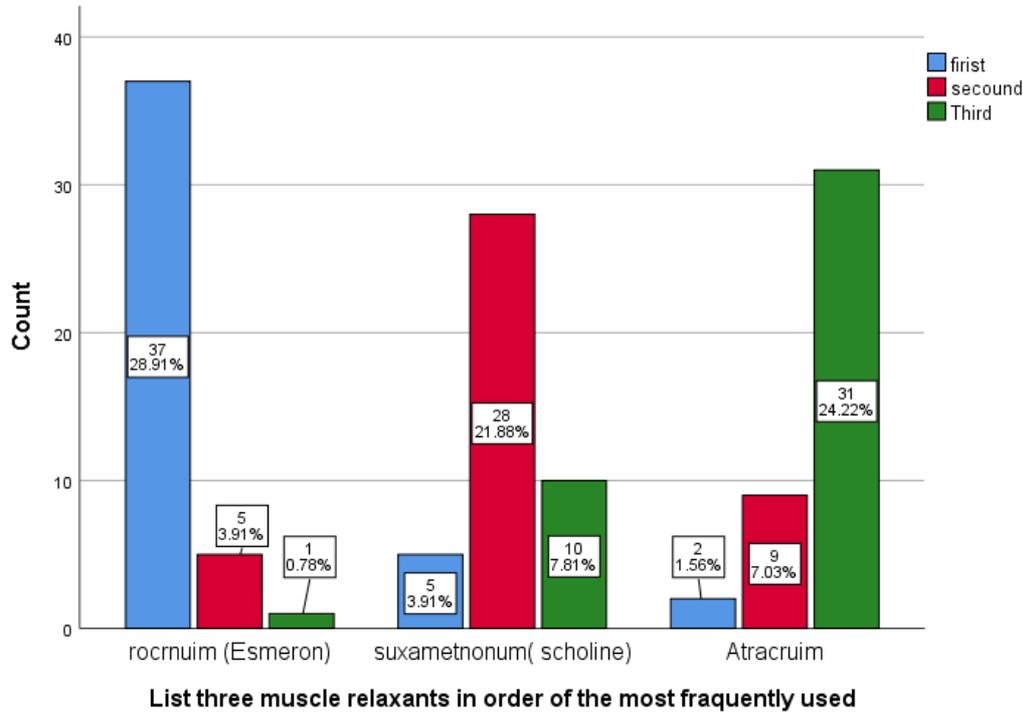


Figure No (3) distribution three muscle relaxants in order of the most frequently used

It is noted from figure (2) that the most commonly used muscle relaxants are: Esmeron, Scholine, and atracrium, where 28.91% of the target population used Esmeron as a first choice. While 3.91% of the target population used it as a second option, and 0.78% were using it as a third option. On the other hand, Scholine was the first choice for 3.91% of the target group, while it came as the second choice for 88% of the target group, and as the third choice for 7.81% of the target group. And finally, Atracrium, where 1.56% of the target audience chose it as the first option, while 7.03% chose it as the second option, and 24.22% of the target group put it as the third option. Accordingly, we conclude that the majority of the target audience agreed that Esmeron would be the first choice with a percentage of 28.91, and Scholine as the second choice with a percentage of 21.88%, while Atracrium came in the last place as the third choice. In other words, the most commonly used and common muscle relaxant in the operating room at Misurata Hospitals is Esmeron.

The reasons for first choice

Table No. (3) Distribution of the study sample by reasons for your first choice.

|       |                   | Frequency | Percent |
|-------|-------------------|-----------|---------|
| Valid | Medical reasons   | 11        | 27.5    |
|       | Availability      | 9         | 22.5    |
|       | Both above answer | 20        | 50.0    |
|       | Total             | 40        | 100.0   |

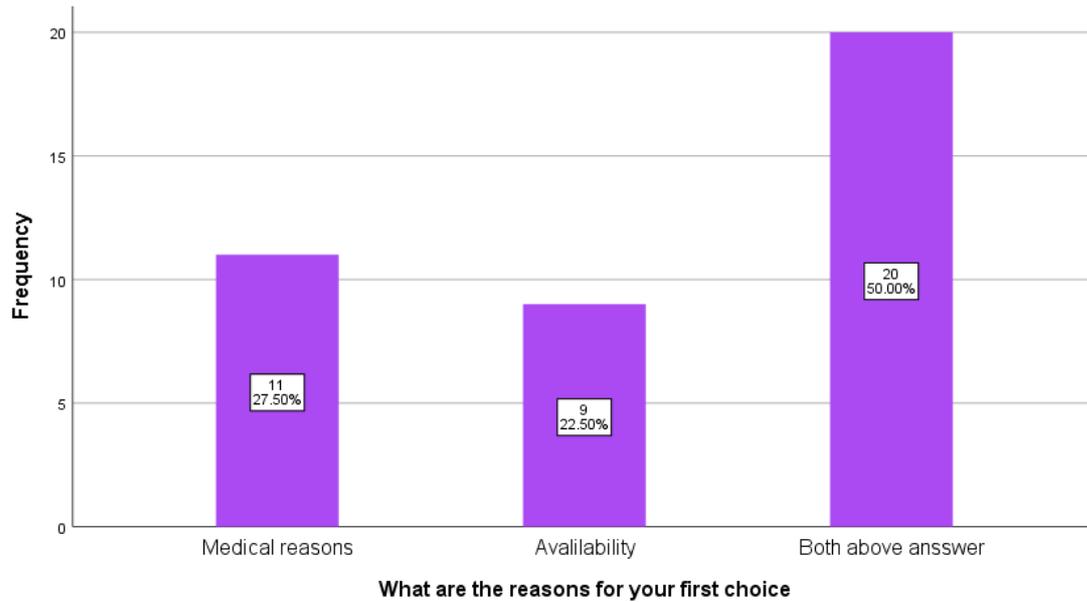


Figure No. (4) Distribution of the study sample by reasons for your first choice.

It is noted from Table (3), figure (4) that reasons for your first choice was medical reasons, and availability that reached 50% that is the highest percentage, while medical reasons reached 27.4% and finally, availability a percentage of 22.5 that is the lowest percentage. So, half of the target 50% attributed the reason for choosing a particular type of muscle relaxant drug as the first choice to both the availability and medical reason, and not for one reason without the other.

The first choice of muscle relaxant for (0-2 years)

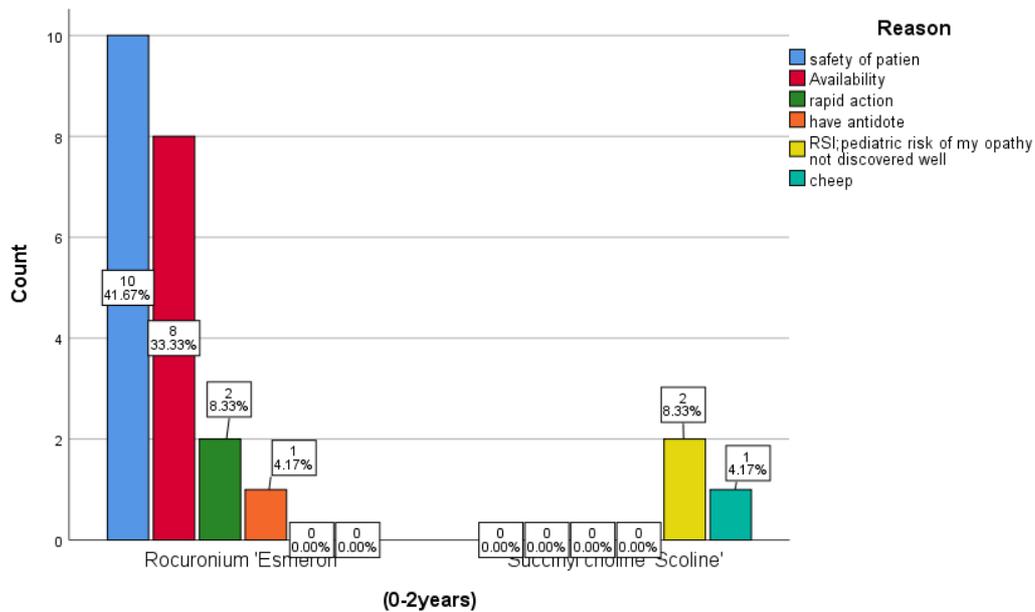


Figure No. (5) The first choice of muscle relaxant for (0-2 years)

It is noted from figure (5) that, In the case of patients aged (0-2 years), the answers are to choose Esmeron and Scoline as the first choice for use as a muscle relaxant drug. As for Esmeron, one of the most common reasons for using it is because it is safe for the patient, where this reason came by (41.67%), and also due to its availability, where it came at a rate of (33.33%), followed by the speed of its effect, where it came by (8.33%), and finally because it has an antidote. While the reason for choosing Scoline is due to two reasons, the first is RSI (pediatric risk of myopathy not discovered well), where it came by (8.33%), and the second reason is due to its cheap price, where this reason came by (4.17%). Through these results, we note that the most used drug for age (0-2 years) is Esmeron followed by Scoline. Moreover, that the most reasons for using Esmeron is for its safety on the patient, while Scoline is due to the pediatric risk of myopathy not discovered well.

The first choice of muscle relaxant for ( $\geq 2-6$  years)

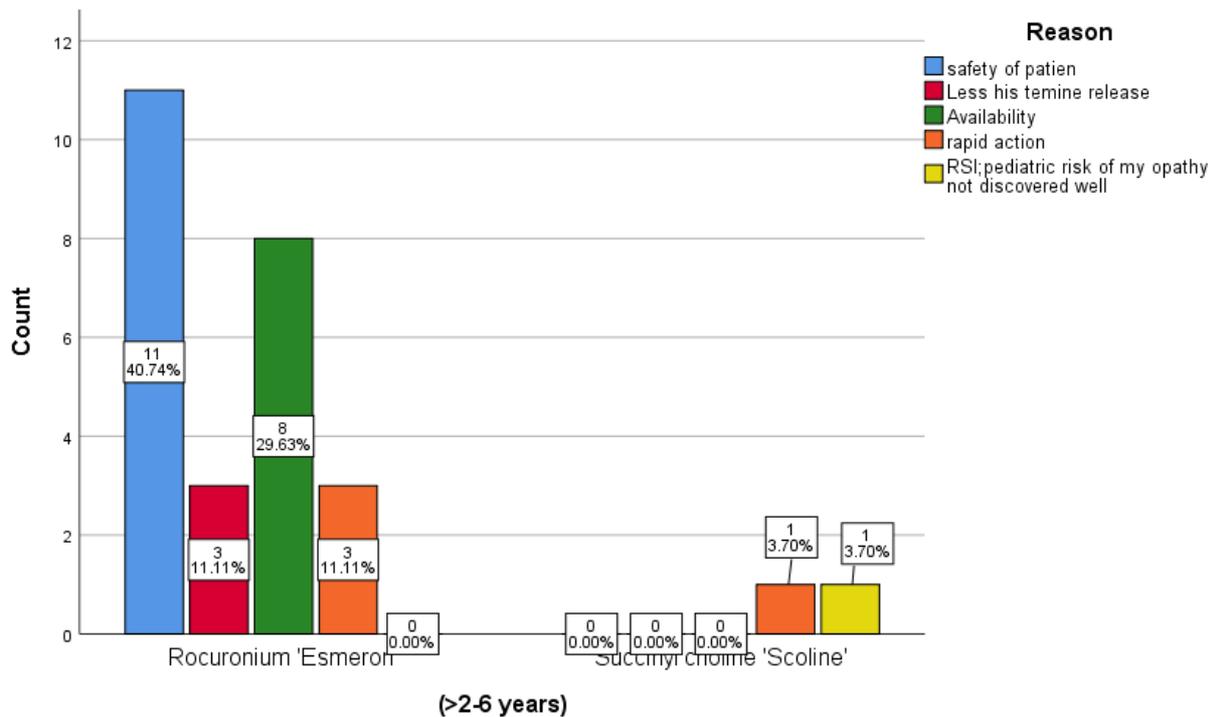


Figure No. (6) The first choice of muscle relaxant for ( $\geq 2-6$  years)

It is noted from figure (6) that, In the case of patients aged from ( $\geq 2-6$  years), the results indicate that most of the target audience prefer to use Esmeron and Scoline, where the choice of Esmeron was higher. The most important reasons for choosing Esmeron for this age group is that it is safe for the patient, as this reason came in a percentage of (40.74%).The second reason, it is the availability of this drug, as it came in a percentage of (29.63%). The third reason is that it does not release or release histamine (11.11%), finally for the speed of its effect on the patient (11.11%). While among the reasons for choosing Scoline were two reasons, the first reason for his rapid action (3.70%) and the second reason is RSI (pediatric risk of myopathy not discovered well), where it came by (3.70%). In conclusion, the muscle relaxant drugs used are Esmeron, followed by Scoline, and one of the most important reasons

for choosing Esmeron is its safety and availability for the patient. As for the reasons for choosing Scoline, it is because of its rapid effect and its less of histamine release.

The first choice of muscle relaxant for (>6-15 years)

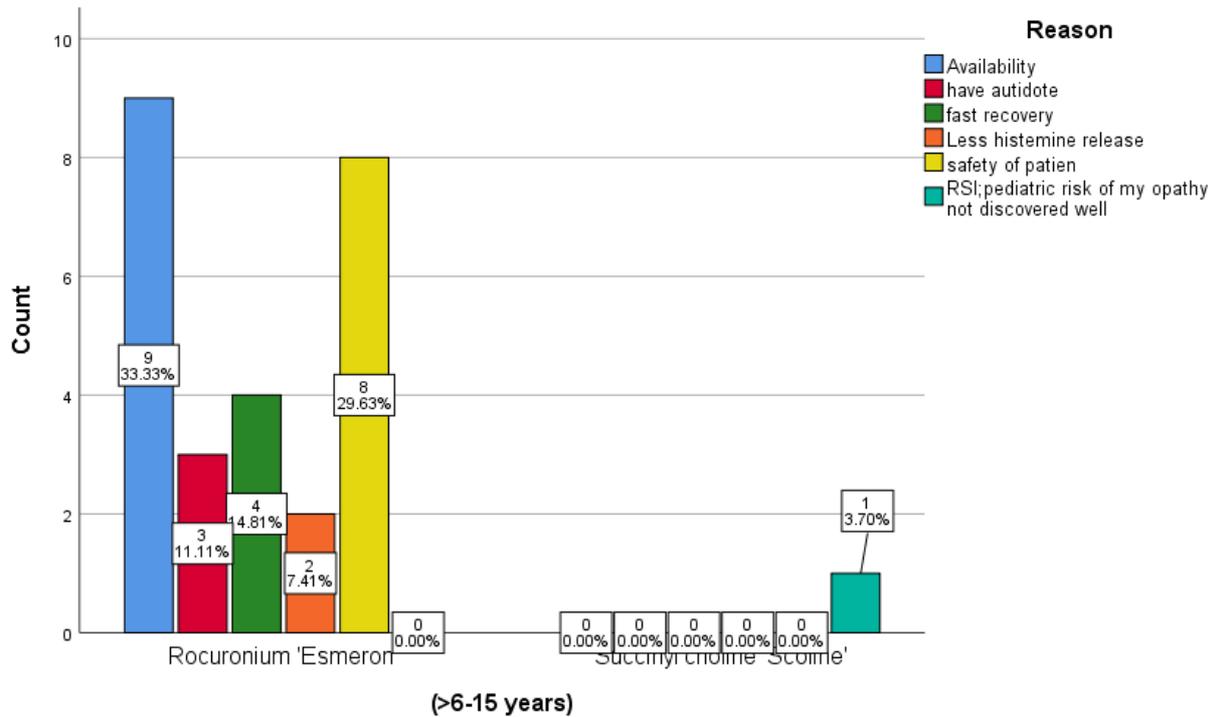


Figure No. (7) The first choice of muscle relaxant for (>6-15 years)

It is noted from figure (7) that, in the case of patients aged (>6-15 years), the results showed that the best muscle relaxant is Esmerone, followed by Scoline. In addition, one of the most important reasons for choosing Esmron is its availability (33.33%). The second reason is that drug is safe for the patient (29.63%). The third reason is to recover quickly (14.81%). The fourth reason is that this drug have an antidote (11.11%). Finally, due to its low release of histamine (7.41%). While the reason for choosing Scoline was RSI (pediatric risk of myopathy not discovered well), where it came by (3.70%). Therefore, the results indicate that the most common reasons for using Esmeron is its safety and availability, and it is the most widely used muscle relaxant. On the other hand, the reason for choosing Scoline is RSI (pediatric risk of myopathy not discovered well).

The first choice of muscle relaxant for (>15-40 years)

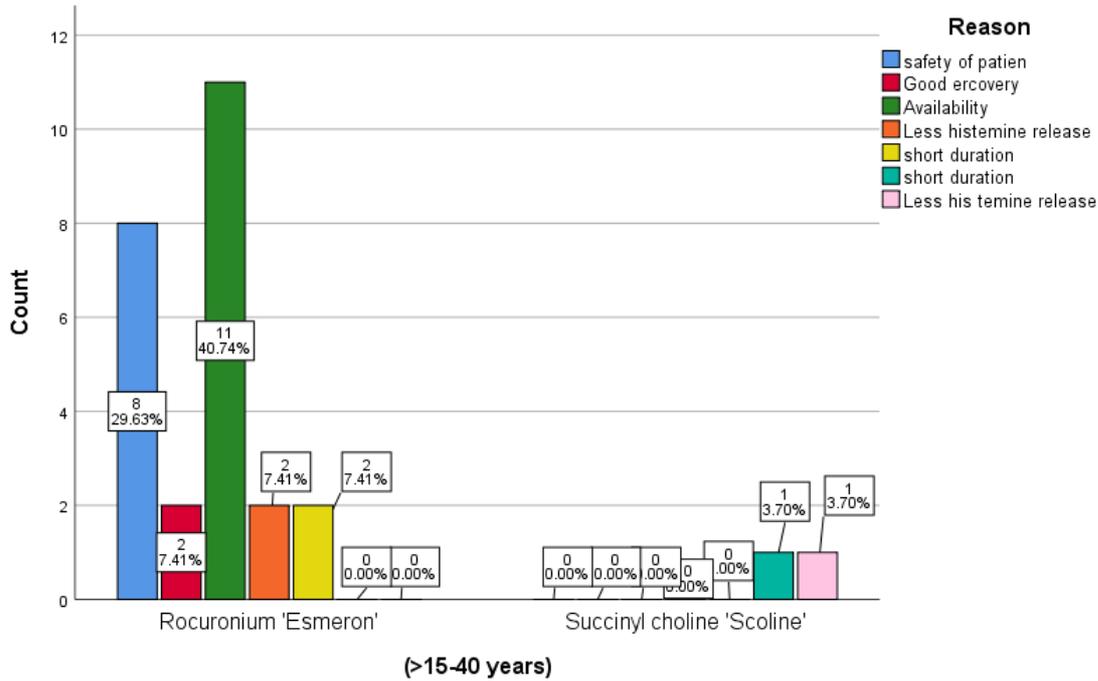


Figure No. (8) The first choice of muscle relaxant for (>15-40 years)

It is noted from figure (8) that, in the case of patients aged (>15-40 years), the muscle relaxant drugs used in this age group are Esmeron and Scoline. This is due to several reasons: First, the reasons for choosing Esmeron, one of the most important reasons for using Esmeron is its availability (40.74%). The second reason is that it is safe for the patient (29.63%). The third reason is his speedy recovery, the fourth reason is his less of histamine release, and finally his period is short. Moreover, the last three reasons came in equal percentages, which were (7.41%). Second: The reasons for choosing Scolin, they are two reasons, and they came in equal percentages (3.70%): the first reason, its short duration and the second reason its less of histamine release. These results indicate that Esmeron is the most widely used muscle relaxant for several reasons, the most important of which is its availability and safety for the patient. Scoline, due to its short duration and less histamine release.

The first choice of muscle relaxant for (>40-60 years)

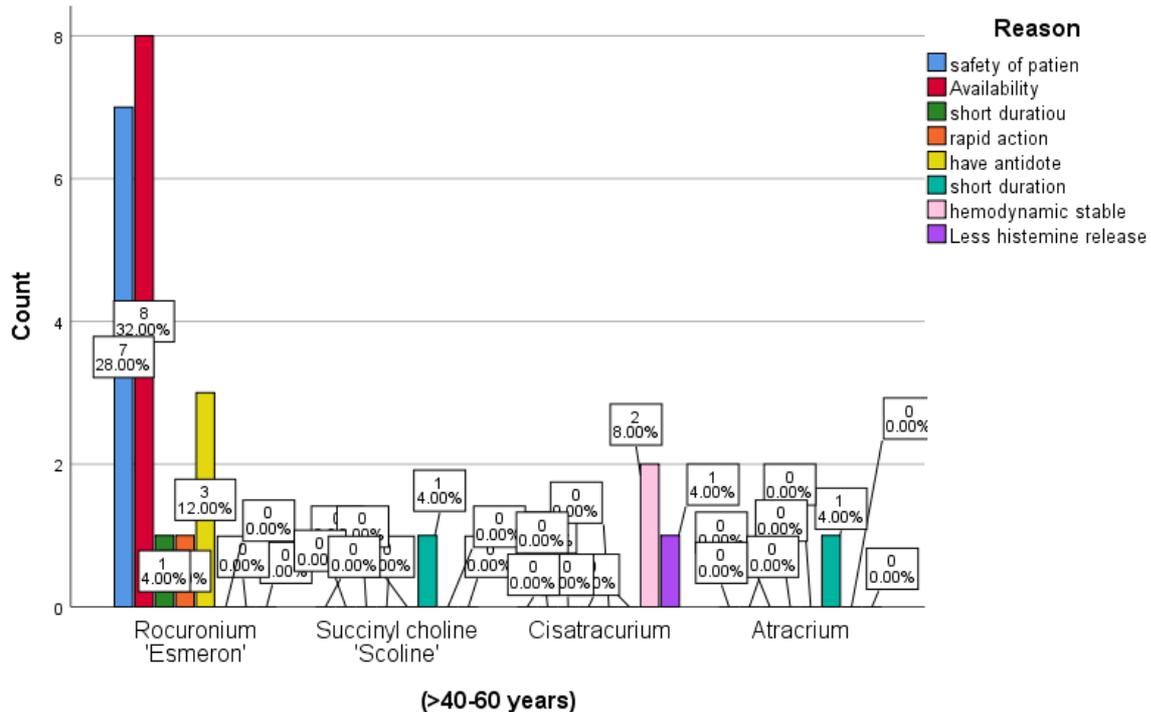


Figure No. (9) The first choice of muscle relaxant for (>40-60 years)

It is noted from figure (9) that, in the case of patients aged (>40-60 years), muscle relaxants used for this age group are Esmeron, Scoline, Cisatracurium and Atracrium. The most important drug used is Esmeron drug. There were many reasons for these choices, and they were as follows, Esmeron: one of the most important reasons for using it was due to its availability, as this reason came by 32%. The second reason was for its safety on the patient, this reason was by 28%. The third reason was that it had an antidote, as it came by 12%. The fourth reason was that its effect was quick, as it came at a rate of (4%). finally due to the short duration of its effect, as it came at a rate of (4%). Scoline: The only reason for choosing this drug was due to the short duration of its effect, which came at a rate of (4%). Cisatracurium: The choice of this drug is due to two reasons: the first is hemodynamic stable, as it came at a rate of (8%), and the second is less of histamine release, which came at a rate of (4%). Atracrium: The only reason for its use is due to the short duration of its effect, as it came in a percentage of (4%). These results indicate that Esmeron is the most widely used muscle relaxant for several reasons, the most important of which is its availability and safety for the patient. There are also other medicines, which are Scoline, Cisatracurium and Atracrium.

The first choice of muscle relaxant for (>60 years)

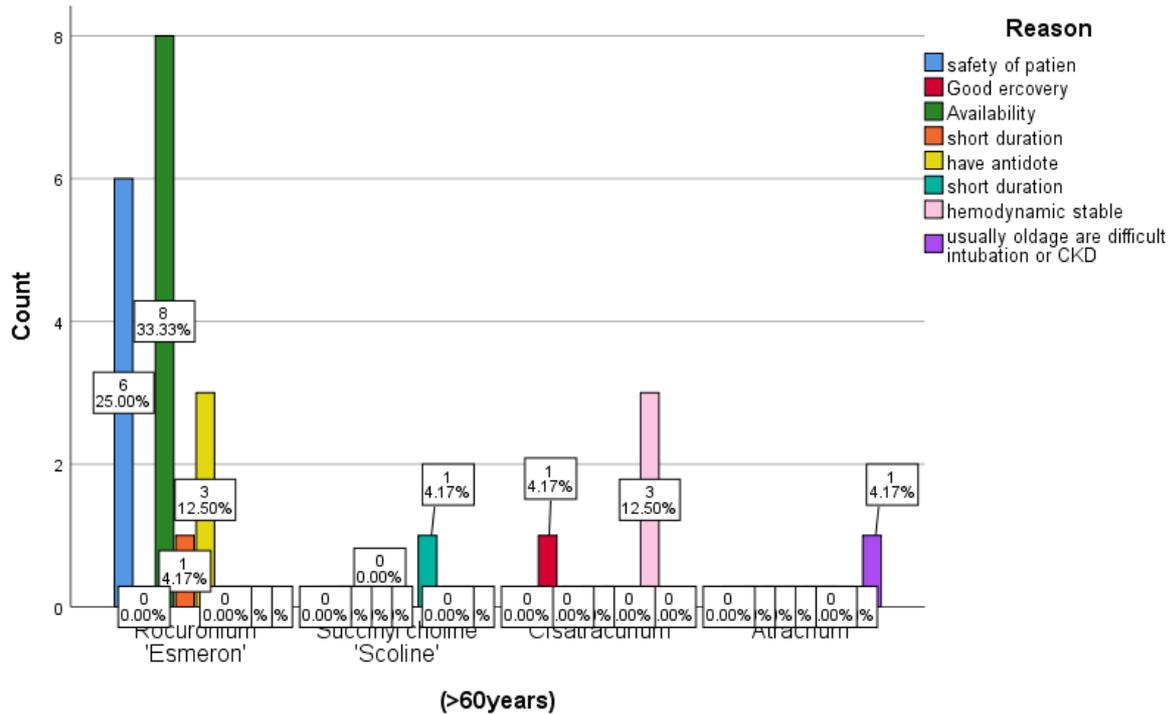


Figure No. (10) The first choice of muscle relaxant for (>60 years)

It is noted from figure (10) that in the case of patients aged (>60 years), muscle relaxants used for this age group are Esmeron, Scoline, Cisatracurium and Atracrium. The most important drug used is Esmeron drug. There were many reasons for these choices, they were as follows, Esmeron: one of the most important reasons for using it was due to its availability, as this reason came by (33.33%). The second reason was for its safety on the patient, this reason was by (25%). The third reason was that it had an antidote, as it came by (12.50%). The fourth reason was the short duration of its effect, as it came at a rate of (4.17%). Scoline: The only reason for choosing this drug was due to the short duration of its effect, which came at a rate of (4.17%). Cisatracurium: The choice of this drug is due to two reasons: the first is hemodynamic stable, as it came at a rate of (12.50%), and the second is good recovery, which came at a rate of (4.17%). Atracrium: The only reason for its use because usually old age are difficult intubation or CKD, as it came in a percentage of (4.17%). These results indicate that Esmeron is the most widely used muscle relaxant for several reasons, the most important of which is its availability and safety for the patient. There are also other medicines, which are Scoline, Cisatracurium and Atracrium

Q6- Arrange your selection according to duration of the operation.

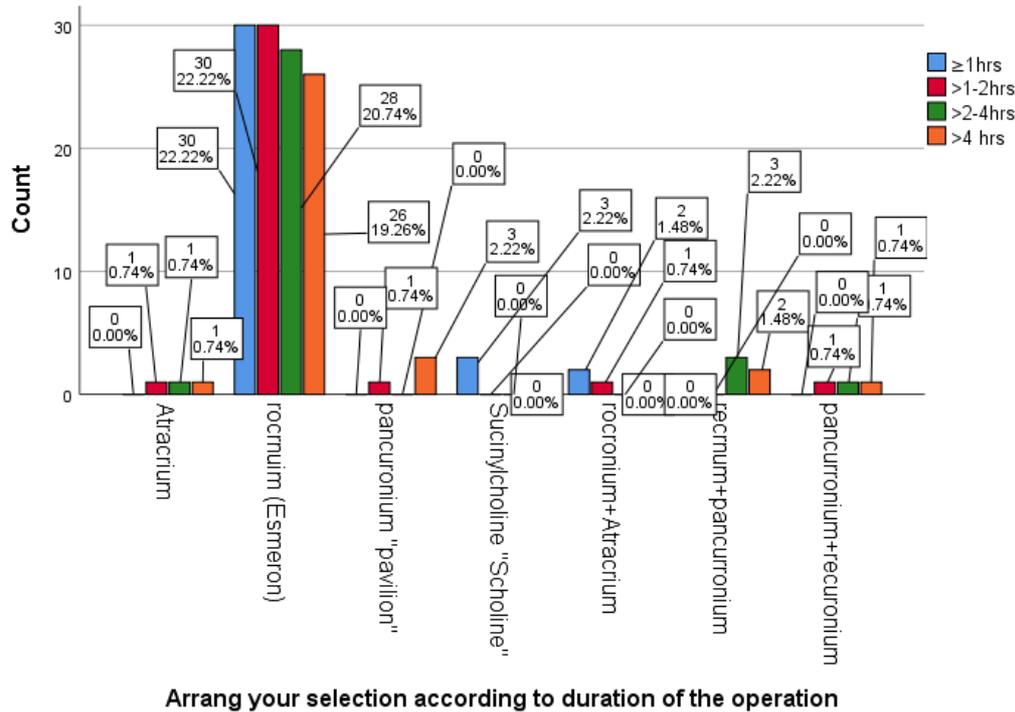


Figure No. (11) The first choice of muscle relaxant according to duration of the operation

The figure (11) shows that there is a relationship between the length of the surgery and the choice of muscle relaxant medication. we note that in surgical operations  $\geq 1$ , the most used muscle relaxant is esmeron with a percentage of (22.22%), scholin with a percentage of (2.22%), and finally esmeron and atracurium with some percentage (1.54%). The figure also indicates that during surgeries ( $>1-2$ hrs), esmeron is also the most used muscle relaxant with a percentage of (22.22%), followed by pavilion, atracurium, esmeron and atracurium, pavilion and esmeron, where all these options have the same percentage (0.74%). While in surgical operations ( $>4-2$ hrs), Esmeron comes in the first choice with a percentage of (20.74%), followed by esmeron with the Pavilion with a percentage of (2.69%), and then comes Atracurium with a percentage of (0.74%). Finally, during surgeries ( $>4$  hrs), esmeron comes first with a percentage of (19.26%), followed by esmeron and Pavilion with (2.96%), and then Atracurium with (0.74%). through these results, we note that the most commonly used drug in surgical operations of all kinds is esmeron alone, and then Esmeron with another muscle relaxant.

**Summary of findings:**

Through these results, we find that the vast majority of those targeted were a 3rd doctor with a percentage of 30.2%. While the lowest category of the target group was a professor with a percentage of 4.7%. As we have noticed, the vast majority of those targeted were working in public hospitals only, at a rate of 68.3%. While a very small group of anesthesiologists targeted, whose percentage does not exceed 73%, are those who work in both public and private hospitals., we also conclude that the majority of the target audience agreed that Esmeron would be the first choice with a percentage of 28.91, and Scholine as the second choice with a percentage of 21.88%, while Atracruim came in the last place as the third

choice. In other words, the most commonly used and common muscle relaxant in the operating room at Misurata Hospitals is Esmeron. Half of the target 50% attributed the reason for choosing a particular type of muscle relaxant drug as the first choice to both the availability and medical reason, and do not for one reason without the other. We note that the most used drug for age (0-2 years) is Esmeron followed by Scoline. Moreover, that the most reasons for using Esmeron is for its safety on the patient, while Scoline is due to the pediatric risk of myopathy not discovered well. The muscle relaxant drugs used with (2-6 years), are Esmeron, followed by Scoline, and one of the most important reasons for choosing Esmeron is its safety and availability for the patient. As for the reasons for choosing Scoline, it is because of its rapid effect and its less of histamine release. In addition, the results indicate that, in the case of patients aged (>6-15 years), the best muscle relaxant is Esmerone, followed by Scoline. The most common reasons for using Esmeron is its safety and availability, and it is the most widely used muscle relaxant. On the other hand, the reason for choosing Scoline is RSI (pediatric risk of myopathy not discovered well). In the case of patients aged (>15-40 years), Esmeron is the most widely used muscle relaxant for several reasons, the most important of which is its availability and safety for the patient. Scoline, due to its short duration and less histamine release. While with patients aged (>40-60 years or more), Esmeron is the most widely used muscle relaxant for several reasons, the most important of which is its availability and safety for the patient. There are also other medicines, which are Scoline, Cisatracurium and Atracrium.

#### **Discussion:**

Through our current study, we note that the most important muscle relaxant in surgical operations is esmeron. Esmeron has several advantages, for example: its rapid onset of action, hemodynamic stable, and its lack of histamine release, and this was confirmed by previous studies; Where (Alvarez-Gómez JA, 1997) indicated that the most used drug as a muscle relaxant during surgical operations is esmeron, and he also referred to the same reasons that we concluded through this study. In addition, we concluded from our study that the second muscle relaxant during surgical operations after Esmeron is Scholin, as it has almost the same features as Esmeron, but its side effects are more than Esmeron. It is considered the second option in the absence of an esmeron, and this was confirmed by some previous studies, including the study carried out by Perry J et al., 2003. According to some studies, it appears that atracurium and cisatracurium have a similar safety profile and that atracurium has a cost benefit compared to cisatracurium in initial loading doses. In patients with instability of hemodynamic parameters, cisatracurium was the appropriate choice (Movafegh A et al., 2013). Our study indicated that atracurium and cisatracurium are the other two options, but in very small proportions. The results of some previous studies confirmed that Rocuronium provides better surgical conditions and allows the use of lower doses of remifentanil compared to succinylcholine and cisatracurium in ML, This makes it possible to reduce the time of awakening and complications associated with high doses of remifentanil (Aragón-Benedí C et al., 2021). This agrees completely with our current study on muscle relaxants. Moreover, our study showed that the choice of muscle relaxant drugs differs according to the age of the patient, but the choice agreed upon by the vast majority is Esmeron, while the choices differ with the rest of the drugs and for different reasons mentioned previously. In addition, through our interviews with many anesthesiologists, the majority of doctors confirmed the use of muscle relaxants with infants, while a few of them denied the use of muscle relaxants with this age group without mentioning the reasons. This study also showed that the selection of

appropriate muscle relaxants varies according to the length of the surgical operation, which confirms the effect of the type of surgery on the selection of the appropriate medication. On the other hand, they agreed that esmeron would be the preferred and appropriate option, regardless of the length of the surgery.

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