„OVIDIUS “ UNIVERSITY OF CONSTANTA

DOCTORAL SCHOOL OF MEDICINE

MEDICINE DOMAIN

DOCTORAL THESIS

THE VALUE OF REGIONAL ANESTHESIA IN UPPER LIMB SURGERY

SUMMARY

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CONSTANTA

2024

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I.THE MOTIVATION OF THE TOPIC CHOICE

The interest of researchers in the field of anesthesia, specifically regional anesthesia, has grown in the last decade towards regional anesthesia techniques, specifically towards plexus and peripheral nerve blocks. With the advent of the neurostimulator, regional anesthesia gained momentum, being widely used successfully in all nerve plexuses and peripheral nerves. In recent years, attention has been directed towards using the eco-guided method.

Each method involves vast knowledge of anatomy, physiology, electrophysiology and anaesthesia. To this is added, of course, the motor skills of each anesthesiologist, each technique requiring a learning curve for each of us, anesthetists.

Following the increasingly frequent use in my current practice I decided that the choice of this topic is that to demonstrate that regional anesthesia techniques at this time provide effective intra- and postoperative analgesia.Also, they ensure preoperative henodynamic stability, and can be used successfully in patients who in another period of time would have received anesthetic contraindications and practically the case remained unsolved surgically, possibly treated conservatively orthopedic, and if it was an urgent procedure, it was done with a high risk of perioperative mortality.

Reducing the perioperative consumption of analgesic and opioid medication with a decrease in respiratory and cardiovascular complications, as well as a decrease in postoperative vomiting and nausea is another benefit of regional anesthesia techniques.

Studying the benefits, complications and risks of using these regional anesthesia techniques in this study is to be able to say if they as such are sufficient to ensure all physical and especially mental comfort in this stressful context called orthopedic surgery.

I I. THE CURRENT STAGE OF KNOWLEDGE

"The brachial plexus (Pb) is formed from the anastomosis of the anterior branches of the roots of the cervical nerves C5-C8 and the first thoracic spinal nerve T1, branches that represent the roots of the plexus and later join between them forming the trunk. [47,48]

Brachial plexus - terminal branches. ***The musculocutaneous nerve*** is the one that provides the motor innervation of the coracobrachial muscle and the biceps brachii muscle. It also provides the sensitive innervation of the antero-external and partially postero-external area of the forearm [49] **.** ***The median*** nerve provides the motor innervation of the following muscles: pronator teres, flexor carpi radialis, palmaris longus, superficial flexor digiti, flexor pollicis longus, flexor profundus fingers, pronator square, pollicis brevis, pr imum and second lumbrical. [50]

The ulnar (ulnar) nerve innervates the motor flexor carpi ulnar muscle, internal 1/2 of the deep flexor digiti, the short muscles of the little finger and all interosseous muscles, umbricals 3-4, adductor pollicis. [74]

The cutaneous antebrachial medial nerve is the one that provides sensitivity to the medial part of the anterior and posterior surfaces of the forearm.

The cutaneous brachial medial nerve is the one that provides sensitivity to the integuments of the medial part of the arm.

The radial nerve innervates the motor muscles: triceps, anconeus, extensor carpi brevis and longus, supinator, extensor carpi ulnaris, extensor digitorum common, extensor digitorum V, abductor longus, extensor longus and extensor brevis of the policy, its own extender of the index. [45,44]

The axillary nerve innervates the motor deltoid, small round and sensitive integument of the shoulder and the lateral and upper portions of the arm." [1] [43]

"Peripheral nerve blocks (PNBs) have the effect of temporally reversible, spatially delimited and optionally selective stopping (anesthesia / analgesia) of nerve conduction (vegetative, nociceptive and motor) in peripheral nerves detected by external methods and accessed by local anesthetics. [51]

Brachial plexus axillary block equipment and technique. The equipment needed to perform:

- sterile gloves and sterile small fields
- sterile gloves and sterile marker and an elctrod
- 10 ml syringe with local anesthetic, xylin 1% for skin anesthesia

[1] www.efs.ucv.ro/pdf/studenti/cursuri_master/note_curs_nervos.pdf

- 25 G stimulation needle
- the syringes with the chosen local anesthetic, in our case with ropivacaine
- peripheral nerve stimulator

The arm to be anesthetized is abducted to approximately 90 degrees. The elbow is flexed and the forearm sits comfortably, with pillow support. We mount the electrorod. We disinfect the skin and make a surgical field, place the fields and then infiltrate the skin and subcutaneous tissue with lidocaine. [59,60]

The peripheral nerve stimulator is set to deliver 0.5-2mA (2hz, 0.1 msec) and we make the connection with the electrode, we inject anesthetic into the needle to fill the path. We prick the skin and start the stimulation with the axillary artery under the hand opposite to the one in which we hold the needle.

After we get a motor response, the needle is advanced slowly and then after we have the best motor response, we reduce the amplitude to 0.5 mA and inject all the desired amount of anesthetic, all this time we aspirate with the syringe every 5 ml to reduce the risk of accidental vascular injection. [98,99]

Several injection techniques can be performed, either the technique by identifying a single nerve and injecting the entire amount of anesthetic, or finding with the stimuplex each nerve around the axillary artery and injecting it with smaller amounts of local anesthetic. [102,104,106]

III. OBJECT LEVELS OF THE STUDY

The personal research aims to evaluate and establish whether the regional anesthesia techniques, specifically the axillary brachial plexus block as the only anesthetic technique option, can provide patient comfort both intraoperatively and 24 hours postoperatively.

The main objectives of the research

- Evaluation of the analgesia provided by the axillary plexus block compared to general anesthesia, this being obtained by analyzing the NRS pain score.
- Assessment of intraoperative hemodynamic response under anesthesia by analysis of blood pressure and pulse measurements.
- Incidence of immediate perioperative complications and complications 24 hours postoperatively.
- Evaluating the correlation between the type of anesthesia chosen and the associated pathologies of the patients, the vast majority of patients these days have chronic conditions that automatically, depending on the type of anesthesia chosen, can decompensate.
- Establishing the link between postoperative recovery, hospitalization days and the type of anesthesia used in upper limb surgery

Secondary objectives of the research

- Identifying the age and sex categories in which fractures of the upper limb occurred, if they occurred more in one of the sexes and if there is a correlation between age and certain fractures.
- Analysis of the types of fractures and the type of anesthesia used, if there is a fracture association - the choice of a certain technique.
- Identifying age differences in fractures.
- Identification of associated pathologies and their quantification, the vast majority of patients have chronic conditions in treatment or not.

- Analysis and determination of rapid and late complications depending on the chosen anesthetic technique
- Analysis of the association of more frequent complications with the anesthetic technique chosen by the anesthetic used

IV. MATERIAL AND METHOD

As part of the doctoral research, I carried out a prospective, observational study and it was carried out on 82 patients hospitalized in the Orthopedics and Traumatology Clinic of the Constanța County Emergency Clinical Hospital between 06.06-12.31.2016. 82 patients with ASA risk (anesthetic-surgical risk) I-III.

We used inclusion and exclusion criteria in the study. The patients in the study were divided into two groups: the AG group - that is, the group of patients who received general anesthesia and the AR group - the group that received regional anesthesia.

V. RESULTS

In terms of the type of anesthesia used, 52% of patients were treated with AR, and the remaining 48% received general anesthesia. As a number, it means that 39 patients received axillary plexus block ie AR and 43 patients received AG. That said, the AR Group has 39 patients and the AG Group has 43 patients.

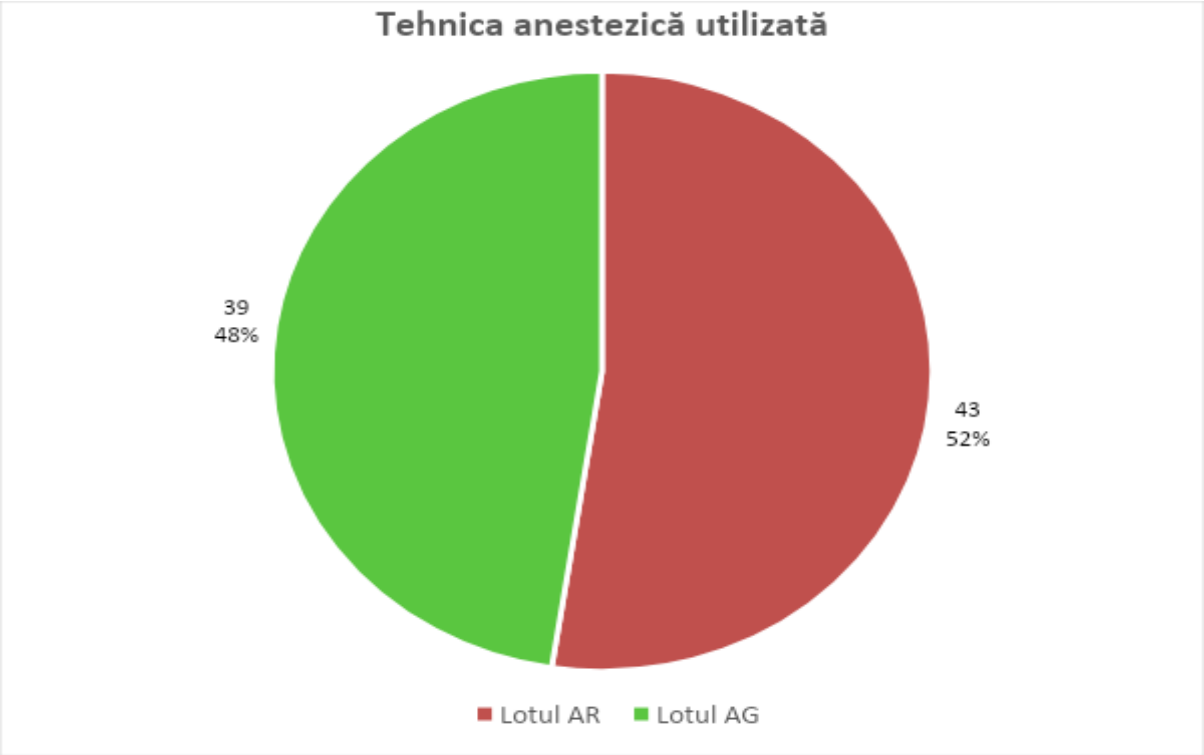

Figure 1 . Grouping of patients

It was observed that the male gender with a percentage of 56.5% is the majority of the AG Batch while the female gender represented only one third 36.1% of the patients undergoing surgery in the AG Batch.

Thus, clear differences are found, according to gender, in the AG group. However, the statistical significance check, by means of the Chi-square, indicates a statistically insignificant result (p=0.066).

In the case of the AR Group, the division by gender was the opposite of the AG Group, in this case the percentage of female patients was 63.9% compared to men with a percentage of 43.5%, without statistical significance.

Group distribution according to the anatomical level of the fracture

Depending on the localization level of the fracture, we found, as was to be expected, that the fractures at the level of the humerus were more than 80% of the cases with total

anesthesia, they belonged to Lot AG representing the highest percentage. This fact is probably due to the fact that AR incompletely and inefficiently covers the territory that was to be subjected to surgical intervention. In the case of fractures at the level of the radius, only a quarter of the patients are part of the AG Group, the rest being part of the AR Group.

Fractures of both forearm bones, two thirds of the patients are in the AR group.

Table 1. Crosstabulation test results to establish the correlation between the fracture type variable and the anesthetic technique used

			Lot Type		
			Lot AR	Lot AG	Total
Fracture level	Humerus	Number	4	20	24
		% of Fracture Level	16.7%	83.3%	100.0%
		% of Lot Type	9.3%	51.3%	29.3%
	Radius	Number	34	11	45
		% of Fracture Level	75.6%	24.4%	100.0%
		% of Lot Type	79.1%	28.2%	54.9%
	Both bones	Number	8	4	12
		% of Fracture Level	66.7%	33.3%	100.0%
		% of Lot Type	9.3%	20.5%	14.6%
	Fist	Number	1	0	1
		% of Fracture Level	100.0%	0.0%	100.0%
		% of Lot Type	2.3%	0.0%	1.2%
Total		Number	43	39	82
		% of Fracture Level	52.4%	47.6%	100.0%
		% of Lot Type	100.0%	100.0%	100.0%

The statistical conclusions indicate from the result of the Chi-square test that the observed differences are statistically significant ($p<0.001$), the observed percentages indicating a higher proportion of humerus fractures in Group AG compared to forearm fractures within

the same group. And in Group AR, forearm fractures predominated either as a single bone or as both bones.

Group distribution of patients according to chronic associated diseases In the case of patients with associated cardiovascular diseases, we analyzed the distribution in the study group. Thus, from the total of Lot AR, approximately 29 presented cardiovascular diseases, while, in the case of Lot AG, only a quarter of 12 patients also had cardiovascular diseases. However, the observed differences were statistically significant ($p<0.001$)

Table 2. Crosstabulation test results to establish the correlation between associated cardiovascular conditions and the anesthetic technique used

			Lot Type		
			Lot AR	Lot AG	Total
Cardiovascular diseases	Not	Number	29	12	41
		% of Lot Type	88%	12%	67.1%
	Yes	Number	17	10	27
		% of Lot Type	39.5%	25.6%	32.9%
Total		Number	46	22	88
		% of Lot Type	100.0%	100.0%	100.0%

The evaluation of the length of hospitalization days according to the type of anesthesia used in the two groups The average length of hospitalization was in the case of patients belonging to Group AG, i.e. subjected to general anesthesia, it was 6.82 days, the standard deviation of 4.34 days and the median of 6 days. In the case of patients from the AR group, i.e. those who received regional anesthesia, axillary plexus block, the average number of hospitalization days was lower, i.e. 5.33 days, with a standard deviation of 3.31 days and a median of 4 days .It is thus observed that the patients who benefited from regional anesthesia were hospitalized for a smaller number of days.

Table 3. Descriptive statistical indices of batch variation according to days hospitalization

Lot Type	N	Arithmetic mean	Standard deviation	Median	Amplitude of Variation	Minimum	Maximum
It	43	5.33	3.307	4.00	16	1	17
AG	39	6.82	4.340	6.00	19	1	20
Total	82	6.04	3.882	5.00	19	1	20

From the point of view of the distribution on the study groups according to the days of hospitalization, the results indicate that when regional anesthesia was used, most patients were hospitalized for a period of 3-5 days (in total representing approximately 40% of cases), while, in the case of those in the AG group for which general anesthesia was used, a significant percentage (approximately 38.5%) were discharged after 6-7 days of hospitalization.

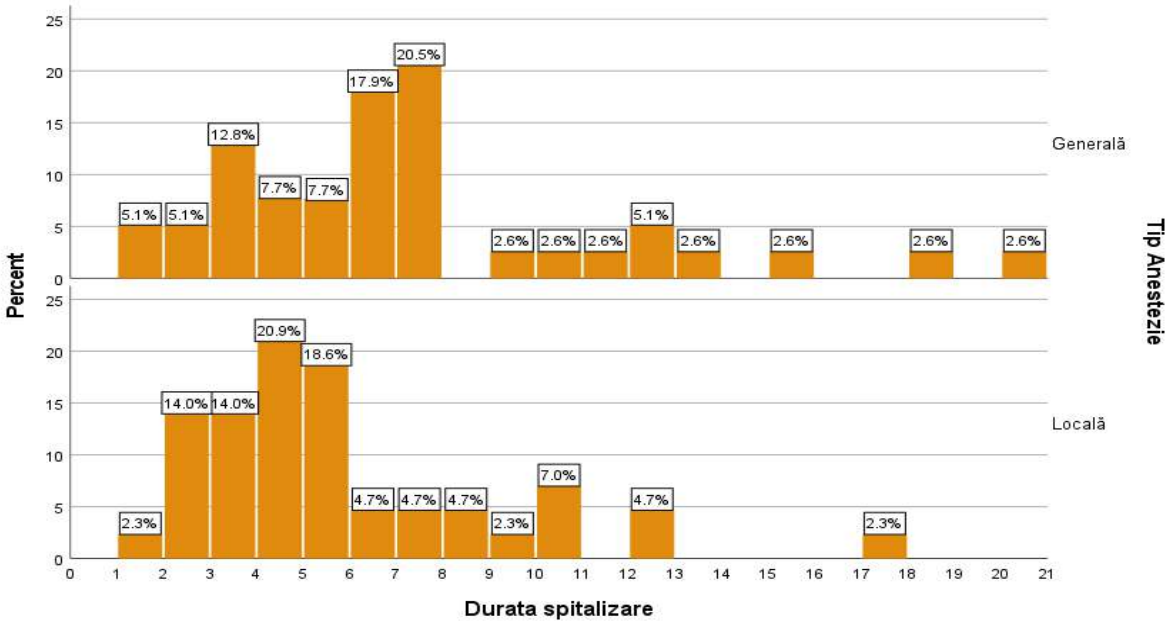

Figure 2. Relation between the anesthetic technique used and the duration of hospitalization

We monitored the consumption of analgesic medication depending on the studied group -KETOPROFEN is a non-steroidal anti-inflammatory with analgesic effects, it acts by inhibiting prostaglandin production.

Table 4. Chi-Square test results for the ketoprofen consumption variable in the two groups

	Value	df	Statistical significance (2 tailed)	p Exact (2 tails)	p Exact (1 tail)
Chi-square	.003a	**1**	**.957**		
Yates correction	.000	1	1.000		
The Likelihood Ratio	.003	1	.957		
Fisher's Exact Test				1.000	.567
Mantel-Haenszel test	.003	1	.957		
Number of valid cases	82				

The need for Ketoprofen did not vary significantly according to the type of anesthesia used. Thus, in the case of the AR group of patients, in the case of 30.8% Ketoprofen was used, while, for patients from the AG group, the percentage was very close, 69.2%. The minimal percentage difference observed is statistically significant ($p<0.0001$), thus indicating that the proportion of ketoprofen use differs according to the type of anesthesia used, the proportion of Ketoprofen use being clearly higher in the AG group.

Monitoring the consumption of analgesic medication according to the study group -PARACETAMOL In the case of paracetamol use, we observed statistically significant differences between the two study groups ($p<0.001$). Thus, in the case of the group of patients from the AR Group, 79.1% benefited from paracetamol treatment, while, in the case of the AG group of patients, their percentage was significantly higher, 94.9%.

Table 5. Crosstabulation test results to establish the correlation between patacetamol consumption and the anesthetic technique used

			Lot Type		
			It	AG	Total
Paracetamol use	Not	Number	2	9	11
		% of Lot Type	5.1%	20.9%	13.4%
	Yes	Number	34	37	71
		% of Lot Type	79.1%	94.9%	86.6%
Total		Number	43	39	82
		% of Lot Type	100.0%	100.0%	100.0%

Monitoring the consumption of analgesic medication according to the studied group -MORPHINE . As expected, the need for morphine differed significantly between the two groups, both in terms of the frequency with which it was used,2, 3% in the AR group of patients, respectively 89.7% in the AG group of patients, as well as from a statistical point of view ($p<0.001$).

Table 6 .The results of the Crosstabulation test to establish the correlation between the consumption of morphine and the anesthetic technique used

			Lot Type		
			It	AG	Total
Use Morphine	Not	Number	42	4	46
		% of Lot Type	97.7%	10.3%	56.1%
	Yes	Number	1	35	36
		% of Lot Type	2.3%	89.7%	43.9%
Total		Number	43	39	82
		% of Lot Type	100.0%	100.0%	100.0%

The obtained results show us through statistical tests that the postoperative analgesia of patients with fractures who are part of the AG group was highly dependent on the administration of opioids, in our case, morphine, almost 90% of the patients receiving.

Monitoring the consumption of analgesic medication according to the studied group – NEFOPAM In the case of nefopam hydrochloride, a significantly higher proportion of use is also observed in the case of patients in the AG group, i.e. who received general anesthesia (59%) compared to patients whose surgery was performed under regional anesthesia, i.e. Group AR.

The result is statistically significant ($p<0.001$) and demonstrates the existence of a statistically significant association between the type of anesthetic technique chosen and the need for nefopam hydrochloride.

Table 7. Chi-Square test results for the nefopam consumption variable in the two groups

	Value	df	Statistical significance (2 tailed)	p Exact (2 tails)	p Exact (1 tail)
Chi-square	28,478 a	**1**	<.001		
Yates correction	25.972	1	<.001		
The Likelihood Ratio	31.870	1	<.001		
Fisher's Exact Test				<.001	<.001
Mantel-Haenszel test	28.130	1	<.001		
Number of valid cases	82				

In the case of intraoperative hemodynamic stability assessment the result is highly statistically significant, $p<0.001$, the AG group had much more patients, a percentage of 82.1% who presented variations in these values expressed above compared to the AR batch with only 17.9%

Table 8. Crosstabulation test results to establish the correlation between hemodynamic stability and anesthetic technique

			LOT type		
			It	generous	Total
Intraoperative hemodynamic stability	Not	Number	11	36	47
		% of Type LOT	100.0%	17.9%	61.0%
	Yes	Number	32	3	35
		% of Type LOT	82.1%	0.01%	39.0%
Total		Number	43	39	82
		% of Type LOT	100.0%	100.0%	100.0%

Assessing the intensity of acute pain is essential in applying the correct treatment. In this sense in this study we evaluated the pain with the NRS pain score.

NRS is a pain rating scale in which patients rate their pain on a scale from 0 to 10. Where 0 represents no pain and 10 is the most severe pain. Little pain is between 1-4, modest between 4-6 and severe between 7-10.

Regarding the evolution of pain scores over time, the following figure shows the mean values of the scores, depending on the study group and the time of assessment. There is a tendency to increase the score in the case of the AR batch (starting from minimum values). In the case of the AR group at two hours average values of approximately 5 of the score are observed, followed by a significant increase at 4 hours, and at subsequent evaluations after a decrease at the 6-hour evaluation, a relative stagnation of the score resulted.

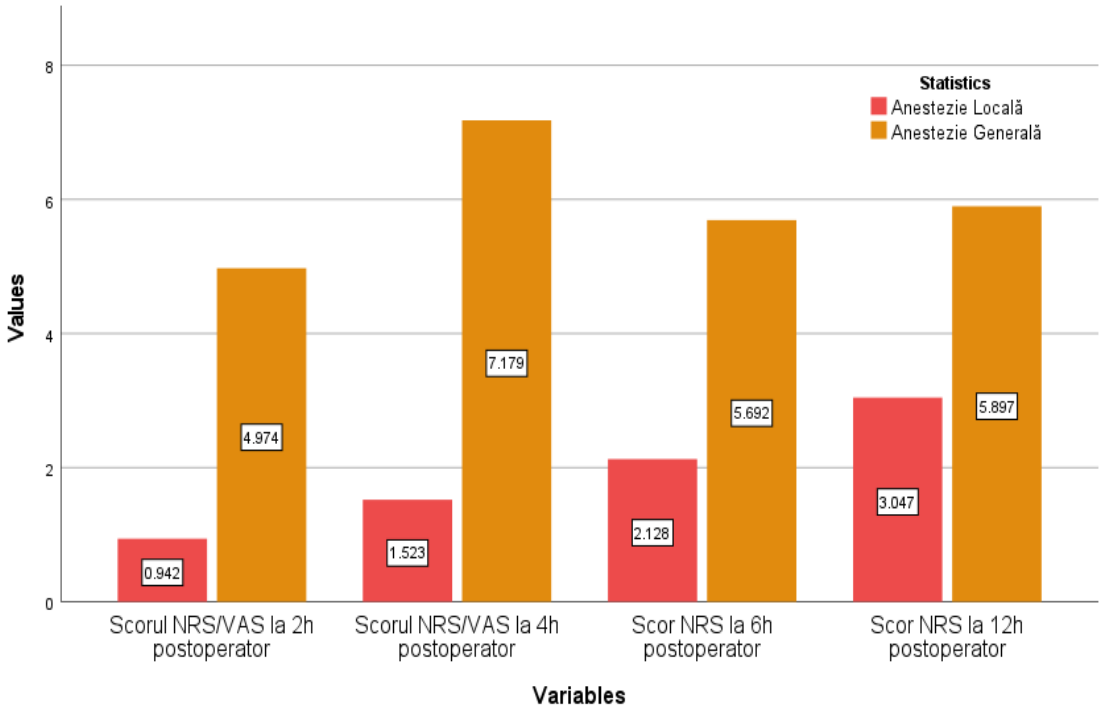

Figure 3. Postoperative NRS/VAS score

Evaluation from the point of view of postanesthetic complications. Anesthetic complications appear in connection with the anesthetic technique used. They are related either to the medication used intraoperatively or related to that used in patient analgesia, we can call them adverse effects rather than complications.

Depending on the type of these complications, in the case of the AR group, the most frequent situations were represented by chills and hypotension (37.5% each), followed by bradycardia and drowsiness.

In the case of the AG group, nausea and vomiting were observed in 29.4% of patients, being the most common category of complications. Complications such as chills and drowsiness were registered with relatively close percentages (14.7% in each situation).

Table 9. Crosstabulation test results to establish the correlation between the type of postanesthetic complications and the anesthetic technique

			Lot Type		
			It	AG	Total
Immediate post-anesthetic complications	Agitation	Number	0	1	1
		% of Lot Type	0.0%	2.9%	2.4%
	Bradycardia	Number	1	0	1
		% of Lot Type	12.5%	0.0%	2.4%
	Raving	Number	0	1	1
		% of Lot Type	0.0%	2.9%	2.4%
	shiver	Number	3	5	8
		% of Lot Type	37.5%	14.7%	19.0%
	Nausea	Number	0	10	10
		% of Lot Type	0.0%	29.4%	23.8%
	Hypotension	Number	3	2	5
		% of Lot Type	37.5%	5.9%	11.9%
	Sleepiness	Number	1	5	6
		% of Lot Type	12.5%	14.7%	14.3%
	Vomiting	Number	0	10	10
		% of Lot Type	0.0%	29.4%	23.8%
Total		Number	8	34	42
		% of Lot Type	100.0%	100.0%	100.0%

VI. DISCUSSIONS

The balance was balanced in terms of the number of patients in each group, the AG group was with a percentage of 52% and the AR group with a percentage of 49%. The male gender with a percentage of 56.5% was the majority in the AG Group and in the AG group the female gender was in the percentage of 63.9%, these differences being statistically insignificant.

Depending on the localization level of the fracture, we found, as was to be expected, the fact that the fractures at the level of the humerus were more than 80% of the cases were part of the AG group, and those from the AR group were the majority with 75% at forearm fractures, with statistically significant differences in the case of each location ($p<0.001$).

In the case of patients with associated cardiovascular diseases from the analysis of the two groups it resulted that 88% were part of the AR group and only 12% of the AG group. . However, the observed differences were statistically significant ($p<0.001$).

In the case of patients with diabetes, we observed statistically insignificant differences depending on the analyzed groups. ($p=0.61$) The AR group had 14.0% diabetic patients and the AG group had 10.3% patients.

Among the anesthetic risk factors, excess weight plays an important role, a fact confirmed in this study, obesity representing a global problem[100]. In the AR group, 31% of the patients were obese and in the case of the AG group, 10.3% of the patients were obese, but the observed differences were statistically significant ($p<0.001$).

Patients with lung diseases, in the case of our study with COPD, 9% of the patients had this condition, approximately 8.5% of the patients were part of the AR group had COPD, while in the case of patients from the AG group, that is, they received anesthesia general.

In patients with b chronic kidney disease in its various stages and in those in the dialysis stage d differences le were statistically significant, the AR group having a p rocent of 10.7% and the AG batch with 2.6%.

The duration of hospitalization days is an important element both for the hospital and for the department and the patient. the longer the duration increases, the higher the costs. [12]The average length of hospitalization for patients belonging to the AG group was 6.82 days, the standard deviation 4.34 days and the median 6 days. In the case of patients in the AR group, the average duration was 5.33 days, with a standard deviation of 3 .31 days and a median of 4 days

In this study, we compared the consumption of NSAID analgesic drugs, nefopam, and that of opioids represented in our case by morphine. Ropivacaine is an anesthetic with a long duration of analgesia that can be used in different concentrations (0.375,0.5 ,0.75 and even 1%)[13]

In our study on the consumption of Ketoprofen, in the case of the AR group of patients 30.8% used Ketoprofen, while for the patients in the AG group, the percentage was very close, 69.2%. The minimal percentage difference observed is statistically significant ($p<0.0001$). In the case of metamizole, the differences between the two analyzed batches were statistically insignificant $p=0.093$.

In the case of nefopam, a percentage of patients of 4.7% in the AR group received this drug and in the AR group of 59.0%, the difference is statistically significant ($p<0.0001$).

In the case of paracetamol use, we observed statistically significant differences between the two study groups ($p<0.001$). Thus, in the case of the group of patients from the AR Group, 79.1% benefited from paracetamol treatment, while, in the case of the AG group of patients, their percentage was significantly higher, 94.9%.

The need for morphine differed significantly between the two groups, both in terms of the frequency with which it was used, 2.3% in the AR group of patients and 89.7% in the AG group of patients, as well as in terms of statistically ($p<0.001$).

Intraoperative monitoring is essential . To evaluate this, we monitored the variations in blood pressure, pulse, and oxygen saturation. The result is highly statistically significant, $p<0.001$, the AG group had many more patients, a percentage of 82.1% who presented variations of these values expressed above compared to the AR group with only 17.9%.

Assessing the intensity of acute pain is essential in applying the correct treatment. [14] In this sense in this study we evaluated the pain with the NRS pain score.

NRS is an evaluation scale in which patients evaluate pain on a scale from 0 to 10. Where 0 represents no pain and 10 is the most severe pain. Little pain is between 1-4, mild between 4-6 and severe between 7-10.

The evaluation of the pain score, NRS postoperatively at 2 hours revealed that the average score for the patients in the AG group was almost five times higher (4.97) compared to the average score for the patients in the AR group (0.94). Most patients in the AG group had a pain score at 2 h of 5 (41%), and the maximum score was 7.5 (one patient).

Comparison of score ranks by Batch type indicates a significantly higher mean rank for those in Batch AG 62.5 compared to 22.45 for Batch AR.

Regarding the pain score at 4 hours postoperatively, we found, for both studied groups, an increase in it, but with the preservation of a significant difference between them. Thus, the AR Batch mean score was 1.523 with a standard deviation of 0.61, while for the AG Batch the mean score was 7.19 with a standard deviation of 1.26.

At 6 hours postoperatively, an increase in the NRS score is observed in patients in the AR group up to a mean of 2.13 with a standard deviation of 0.58 and a decrease in the pain score in the case of those in the AG Group with a mean of 5, 69 with a standard deviation of 0.95. From the point of view of the way in which the data are distributed, it is observed that for the AR Group almost half of the patients have a score of 2 (48.8%) with the tendency for the values above to be in a higher proportion. The observed differences between the two study groups were statistically significant, $z=-7.66$, $p<0.001$.

At the 12-hour post-operative assessment, a trend towards an increase in the pain score is observed for patients in the AR group. Thus, the average value reached 3.05 with a standard deviation of 0.65, while for the group of AG patients the tendency was stagnation, with a slight decrease, up to an average score of 5.89, with a standard deviation of 1.02 . Regarding the mean rank, the same relationship is found as in the other cases, with patients in the AR group consistently presenting lower values of the NRS score at 12 hours.

Another important aspect in the evaluation of the anesthetic techniques used is the occurrence of immediate anesthetic complications. We found that in the AR group they were identified in 18.6% of cases, while for the AG group, they were documented in 87.2% of patients. The differences are statistically significant.

Regarding the type of these complications, in the case of the AR group, the most frequent situations were represented by chills and hypotension (37.5% each), followed by bradycardia and drowsiness.

In the case of the AG group, nausea and vomiting were observed in 29.4% of patients, being the most common category of complications. Complications such as chills and drowsiness were registered with relatively close percentages (14.7% in each situation).

I mention that there were no complications more than 24 hours postoperatively, and if there were any, they were of a neurological nature, that is, damage to the nerves treated with para lysis or just paresthesias.

VII.CONCLUSIONS

- Fractures of the upper limb are more common in men than in women, the male to female ratio is 1:0.7.
- The average age was 56.05 years, with a deviation of 19.01 years, a significant age variability was demonstrated, the extreme values being 17 years and 91 years respectively, fractures can occur at any age.
- The most frequent cases were with fractures of the radius 55%, followed by the humerus with 29% and immediately after with fractures of both forearm bones 15%.
- The analyzed study groups had similar numbers of patients for the most concrete results, the regional anesthesia group 52% and the general anesthesia group 48%.
- 53% of patients who received general anesthesia were male and only 63.1% of patients who received regional anesthesia were female.
- There is no connection between the choice of the type of anesthesia according to the gender of the patients, it is purely random.
- Humerus fractures are complete and complex, not all fracture regions are covered by the axillary brachial plexus block, which is why it turned out in our study where 80% of patients received general anesthesia.
- Axillary brachial plexus anesthesia is ideal for fractures of the radius, both forearm bones, olecranon and fist, where approximately 79.1% have benefited from it.

- The efficiency of regional anesthesia, in the case of our study of the brachial plexus abrod axillary block, is superior in patients with fractures from the lower third of the humerus to the hand.
- In polytraumatized patients, regional anesthesia can be used successfully, in our case 54.5% of polytraumatized patients successfully received this type of technique.

- In the case of patients with cardiovascular diseases, the axillary brachial plexus block is a perfect choice, 39.5% of patients were able to undergo surgery even in those at high risk, thanks to the cardiovascular stability offered.
- In patients with serious cardiovascular diseases, regional anesthesia is a great option when general anesthesia is an absolute contraindication.
- We found an association between the type of anesthesia chosen and obesity 31% of patients were obese and received regional anesthesia and only 10.3% of patients were obese, ensuring lower intraoperative and postanesthetic risks.
- 9% of the study patients had chronic lung diseases and of these 8% received regional anesthesia, which makes it the perfect choice in their case by not interfering with the airway during general anesthesia. It reduces the risk of postanesthetic respiratory complications.
- In patients with chronic kidney disease, regional anesthesia is the best option, it reduces the risk of an exacerbation by not using large amounts of infusions and NSAIDs, 9% of patients received it.
- Regional anesthesia reduces the hospitalization days of patients, the average of the study was 4 days.
- The use of regional anesthesia in the polytraumatized patient reduces the length of hospital stay to an average of 6 days in the present study.
- The consumption of ketoprofen, which is an NSAID, is much reduced when using regional anesthesia compared to general anesthesia, 77.3% of patients did not receive this drug.
- There were no statistical differences in the use of metamizole in both types of anesthetic techniques.
- The consumption of paracetamol was clearly higher in patients with general, 73% of them constantly receiving the drug
- In patients receiving regional anesthesia, morphine consumption is reduced to absent, only 2.3% of patients needed morphine.
- The consumption of nefopam, a centrally acting analgesic, is also much reduced in those with regional anesthesia compared to general, 2 patients only required.

- The general consumption of analgesic medication is reduced by the choice of regional anesthesia technique
- Intraoperative hemodynamic stability was in percentage of 83% of patients with regional anesthesia were without any variation.
- The NRS pain score at 2 hours revealed that the mean score for was almost five times higher (4.97) in patients who received general anesthesia compared to the mean score in patients with regional anesthesia (0.94).
- The NRS pain score at 4 hours was 1.523 with a standard deviation of 0.61 in the case of regional anesthesia, well above the score of patients with general anesthesia.
- The NRS pain score at 6 h was similar to that at 2 and 4 h with both techniques.
- At 12 hours, an increase in the NRS score is also observed in patients with regional anesthesia, the average value reached 3.05, the equivalent of starting the administration of analgesics.
- 18.6% of regional anesthesia patients had immediate postanesthetic complications
- 87.2% of general anesthesia patients had immediate postanesthetic complications
- The postanesthetic complications were: bradycardia, drowsiness, agitation, delirium, nausea, vomiting, chills.
- Nausea with 29% and vomiting with 34% are the most common postanesthetic complications.
- Almost 60% of cases with ASA III risk received regional anesthesia, which means it can be successfully used without risk in patients with high anesthetic-surgical risk.

VIII: SELECTIVE BIBLIOGRAPHY

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