

Evaluation of the Results of Anaesthesia Techniques Used in Patients with Shoulder Fractures

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Abstract:

Background: Anesthesia techniques play an effective role in pain management for patients, which enhances the safety and success of the procedure which contributes positively to the success of the operation. **Objective:** This study aimed to evaluate the anesthetic results during surgical procedures for patients with shoulder fractures. **Patients and methods:** A cross-sectional study was conducted for patients who underwent shoulder fracture surgery under anesthesia. Their ages ranged from (30 - 60) years, which included 70 patients. This study examined anesthesia techniques and surgical procedures, which included shoulder arthroscopy in 35 patients, shoulder arthroscopy with open repair in 7 patients, and reverse total shoulder arthroplasty in 28 patients. All surgeries were performed under both types of anesthesia, which included general anesthesia and regional anesthesia. This study recorded the surgical outcomes of patients in terms of surgical times, estimated blood loss (ml), bleeding, PACU admission, mortality rate, recovery time in months, length of hospital stay in days, follow-up clinical outcomes during and after surgery, complications, pain rate, and health-related quality of life scale. **Results:** Our clinical results for patients in the group that underwent regional anesthesia included operative time was 4.4 ± 2.7 minutes, estimated blood loss was 654.70 ± 160.35 (ml), bleeding included 2 cases, mortality rate was no case, recovery time was 2.2 ± 0.8 months, length of hospital stay was 2.4 ± 0.6 days, patients' quality of life where the most prominent aspects are the physical aspect as before surgery was 40.5 ± 7.8 and after surgery was 80.85 ± 9.63 . The daily activities before surgery were 32.16 ± 4.8 , while the daily activities after surgery were 86.12 ± 9.63 . The pain scores in the last month of follow-up were 0. For the results for the general anesthesia group, the operation time was 3.8 ± 2.5 minutes, the estimated blood loss was 1286 ± 289.56 (mL), the bleeding was 5, the mortality rate was 3 cases, the recovery time was 4.2 ± 1.3 months, the length of hospital stay was 3.1 ± 1.2 days, quality of life of patients as the most prominent aspects are the physical aspect after surgery was 72.53 ± 5.42 and daily activities after surgery. The surgery score was 78.76 ± 5.42 , and pain scores in the last month of follow-up were 3.56 ± 0.22 . **Conclusion:** Our study indicated that regional anesthesia represents the optimal anesthesia for pain

management, healthy quality of life, and a lower rate of complications and mortality compared to general anesthesia, which improves the recovery rate and postoperative health outcomes

Keywords: Shoulder fractures procedures; General anesthesia; Regional anesthesia; Quality of life scale; and VAS pain scale.

Shoulder surgery was considered as an essential part of orthopaedic medicine because of significant progress in the field where it is capable of treating a wide range of diseases, including rotator cuff tears, labral injuries, as well as osteoarthritis [1,2]. The discipline of shoulder surgery was significant advancement over the last 70 years, transforming from a relatively minor orthopaedic specialty to a domain of extensive study and remarkable development. [3-5]

The success of biomedical technology was mostly determined through the progress made, considering the well-established intricacies of the joint [6]. The complex range of motion for the shoulder joint where it is basic in everyday tasks and highlighted the significant effect of shoulder disorders on patients' well-being, where this frequently leads to the need for surgical procedures to alleviate discomfort and restore normal function. [7]

Orthopaedic doctors used a variety of methods, including arthroscopy, open surgery, and joint replacement, to treat shoulder problems. Surgical skill is vital of achieving success; the selection of anaesthetic management is as important in guaranteeing patient comfort, optimising surgical circumstances, and reducing postoperative discomfort. [8]

Anaesthesia plays a crucial role in ensuring the safety and success of surgical operations, particularly during shoulder surgery, where it is sometimes necessary to work closely with the patient throughout the operation [9]. Shoulder operations often include active patient involvement in evaluating joint mobility and stability, as well as a general function, which distinguishes them from several other orthopaedic surgery [10]. Anaesthesia practitioners have distinct problems as they strive to maintain pain management and patient comfort while also preserving the patient's active participation in the surgical procedure. [11]

Effective treatment of pain after shoulder surgery is crucial because the complex structure and abundant nerve supply of the shoulder might result in substantial discomfort if not properly treated [12]. Regional anaesthesia methods, including the interscalene brachial plexus block, have become more popular in recent years [13]. These surgeries provide precise pain relief to the shoulder and upper extremities while enabling patients to remain aware and engage with the surgeon during the treatment. [14]

In addition, several other nerve blocks are being identified throughout time, with the goal of increasing their selectivity [15]. Modern anaesthetic methods provide excellent pain management after shoulder surgery, reducing muscular spasms and facilitating early mobilisation, allowing for the initiation of postoperative physiotherapy [16]. Ultimately, these treatments enhance patient recovery and improve overall outcomes. [17, 18, 19]

Patients and methods

We conducted a cross-sectional study of collected sample data, which included 70 patients who underwent shoulder fracture surgery under anesthesia and whose ages ranged from (30 - 60) years. This study collected demographic and clinical data for patients, as parameters include age, gender, ASA, body mass index, comorbidities, causes of shoulder fractures, smoking factor, education, and economic aspect. This study identified anesthesia techniques and surgical procedures, which included shoulder

arthroscopy in 35 patients, shoulder arthroscopy with open repair in 7 patients, and reverse total shoulder arthroplasty in 28 patients. All surgeries were performed under both types of anesthesia, which included general anesthesia and regional anesthesia.

Our study recorded patients' surgical data, including surgical times, location, and clinical outcomes during and after surgery, which included the operation time, minute of entry into the operating room for ready anesthesia (minute), ready anesthesia for the surgical incision (minute), and surgery from the end of surgery to departure from the operating room (minute). minutes) and total PACU time (minutes) in terms of surgical times, lazy beach chair, urinary catheter placement in terms of positioning, estimated blood loss (ml), bleeding, PACU admission, mortality rate, recovery time in months, length of hospital stay in days, and follow-up clinical outcomes during and after Surgery.

Moreover, our study evaluated the clinical outcomes related to postoperative pain scores in patients using the VAS scale, which ranges from 0 to 10, where 0 represents no pain in patients, and 10 represents the upper limit of severe pain. Also, this study recorded the rate of postoperative complications associated with patients. In addition, the quality of life of patients was measured when comparing between before and after surgery under the approved health quality of life standards, which include physical function, psychological function, social function, and daily activity on a scale ranging from 0 to 100, where 100 represents the optimal quality of life. For patients, 0 represents the worst quality of life for patients. The clinical data methodology for patients was designed and implemented by the SPSS program, version 22.0.

Results

Characteristics	Number of patients [N = 70]	Percentage [%]
Age [years]		
30 – 40	19	27.14%
41 – 50	23	32.86%
51 – 60	28	40.00%
Sex		
Male	56	80.00%
Female	14	20.00%
ASA		
I	4	5.71%
II	9	12.86%
III	57	81.43%
BMI [Kg/m^2]		
28 – 30	12	17.14%

31 - 33	27	38.57%
> 33	31	44.29%
Comorbidities		
1	8	11.43%
2	13	18.57%
3	30	42.86%
4	19	27.14%
Causes		
Traumatic Injuries	6	8.57%
Osteoporosis	36	51.43%
Repetitive Stress	9	12.86%
Falls	5	7.14%
Motor Vehicle Accidents	14	20.00%
Smoking status		
Yes	25	35.71%
No	45	64.29%
Education status		
Primary	11	15.71%
Secondary	15	21.43%
College/University	44	62.86%
Income status, \$		
< 700	42	60.00%
≥ 700	28	40.00%

Table 2: Identify procedures and techniques of anesthesia in shoulder surgery.		
Characteristics	Number of patients [N = 70]	Percentage [%]
Surgery procedures		

Shoulder arthroscopy	35	50.00%
Shoulder arthroscopy with open repair	7	10.00%
Reverse total shoulder arthroplasty	28	40.00%
Techniques of anesthesia		
General anesthesia [GA]	35	50%
Regional anesthesia [RA]	35	50%

Table 3: Intraoperative outcomes of shoulder surgery.			
Characteristics	Group A, RA [N = 35]	Group B, GA [N = 35]	P – value
Surgery procedures times			
Operative time, min (mean ± SD)	4.4 ± 2.7	3.8 ± 2.5	0.0462
Operations room entry to anesthesia ready (min)	6.5 ± 2.7	18.7 ± 8.4	0.002
Anesthesia ready to surgical incision (min)	35.8 ± 16.5	37.3 ± 10.2	0.0461
Surgery end to departure from operations room (min)	7.1 ± 5.2	11.6 ± 9.5	0.0257
Total PACU time (min)	72.43 ± 14.22	80.4 ± 106.85	0.00028
Position			
Lazy beach chair	28 [40%]	26 [37.14%]	
Lateral	40 [57.14%]	14 [20%]	
Urinary catheter placement	2 [2.86%]	30 [42.86%]	
Clinical outcomes			
Estimated blood loss (mL)	654.70 ± 160.35	1286 ± 289.56	< 0.001
Bleeding	2 [2.86%]	5 [7.14%]	0.0477
PACU entry	14 cases	26 cases	0.00256
Mortality rate	0 [0%]	3 [4.29%]	0.045
Recovery time, months	2.2 ± 0.8	4.2 ± 1.3	0.0481
Length of stay in hospital, days	2.4 ± 0.6	3.1 ± 1.2	0.0446
Follow – up	Three months	Three months	0.05

Table 4: Assessment of postoperative pain scores of patients who underwent to shoulder surgery by VAS scale.

Characteristics	Group A, RA [N = 35]	Group B, GA [N = 35]	P – value
Month 1	4.4 ± 1.3	6.5 ± 1.7	0.038
Month 2	1.06 ± 0.42	5.36 ± 0.85	0.0361
Month 3	0	3.56 ± 0.22	0.0275

Table 5: Post-operative complications outcomes of patients with shoulder fractures.

Complications	Group A, RA [N = 35]	Group B, GA [N = 35]	P – value
Infection	2 [5.71%]	3 [8.57%]	0.0462
Nonunion	0 [0%]	1 [2.86%]	0.0026
blood vessel injury	0 [0%]	1 [2.86%]	0.0368
Stiffness and reduced range of motion	1 [2.86%]	1 [2.86%]	0.05
Nausea and vomiting	0 [0%]	2 [5.71%]	0.0014
Total	3 [8.57%]	8 [22.86%]	0.000122

Table 6: Assessment of quality of life associated with patients with shoulder fractures in comparison between preoperative and postoperative.

Domains	Preoperative	Postoperative	
		Group A, RA [N = 35]	Group B, GA [N = 35]
Physical function	40.5 ± 7.8	80.85 ± 9.63	72.53 ± 5.42
Psychological function	43.76 ± 6.9	82.56 ± 9.42	67.35 ± 9.31

Social function	56.34 ± 8.51	84.24 ± 8.75	67.58 ± 6.84
Daily activity	32.16 ± 4.8	86.12 ± 9.63	78.76 ± 5.42

Discussion

The clinical results showed that patients in the age group (51 - 60) years were the most likely to undergo surgical operations, with a rate of 28 cases. Males had a higher rate of 56 cases than females, with a rate of 14 cases. The ASA rates were recorded, which included ASA III with 57 cases and II with 9 cases. Cases I included 4 cases, and they were 44.29% of the total rate of patients with a body mass index > 33. The most common and common causes of infection were osteoporosis at a rate of 51.43% and car accidents at a rate of 20% of the total rate of patients. The percentage of patients who smoked was 25 cases, and Non-smoking patients were 45 cases, people with economic income < 700 were 42 patients, and ≥ 700 were 28 patients.

The surgical results were shown for patients, which were divided into two groups where Group A represents the group that underwent shoulder surgery under regional anesthesia with 35 cases, and Group B represents the group that underwent shoulder surgery under general anesthesia, which included 35 cases, where most of the surgeries were shoulder arthroscopy, which included 35 cases, shoulder arthroscopy with... Open repair included 7 cases, and reverse total shoulder arthroplasty included 28 cases. Data found for patients during surgery for group A included operative time was 4.4 ± 2.7 minutes, entering the operating room for anesthesia was 6.5 ± 2.7 minutes, anesthesia ready for surgical incision was 35.8 ± 16.5 minutes, surgery to departure from the operating room was 7.1 ± 5.2 minutes, total time PACU (minute) was 72.43 ± 14.22, centering centers included lazy beach chair included 28 patients, side position included 40 patients, urinary catheter placement included 2 cases, clinical research results found estimated blood loss was 654.70 ± 160.35 (ml), bleeding included 2 cases, admission PACU was 14 cases, mortality rate was none, recovery time was 2.2 ± 0.8 months, length of hospital stay was 2.4 ± 0.6 days, follow-up duration was three months. While for general anesthesia, the surgical results showed that the operating time was 3.8 ± 2.5 minutes, entering the operating room for anesthesia was 18.7 ± 8.4 minutes, anesthesia ready for the surgical incision was 37.3 ± 10.2 minutes, surgery to departure from the operating room was 11.6 ± 9.5 minutes, total time PACU (minute) was 80.4 ± 106.85, centering centers included lazy beach chair included 26 patients, side position included 16 patients, urinary catheter placement included 30 cases, clinical research results found estimated blood loss was 1286 ± 289.56 (ml), bleeding included 5 cases, PACU admission was 26 cases, mortality rate was 3 cases, recovery time was 4.2 ± 1.3 months, length of hospital stay was 3.1 ± 1.2 days, follow-up duration was three months.

Regarding postoperative results, our results noted a significant difference between both groups that underwent the same surgical procedures. For group A, the results found that the pain scores in the first month were 4.4 ± 1.3, the second month was 1.06 ± 0.42, and the third month was zero. The rate of complications was 3 cases, the most prominent of which was infection, which included two cases. It showed a high superiority for the patients who underwent regional anesthesia in the quality of life of the patients, as it was highlighted where aspects are the physical aspect, where before surgery, it was 40.5 ± 7.8, and after surgery, it was 80.85 ± 9.63, and daily activities before surgery were 32.16 ± 4.8, while daily activities after surgery were 86.12 ± 9.63. While for group B, the results found that the pain scores in the first month were 6.5 ± 1.7, the second month was 5.36 ± 0.85, and the third month was 3.56 ±

0.22. The rate of complications was recorded as 8 cases, most notably infection, which included three patients, and nausea and vomiting, which included 2 cases. A slight decrease was observed for patients who underwent anesthesia. Overall, in terms of patients' quality of life, the most prominent aspects were the post-operative physical aspect, which was 72.53 ± 5.42 , and the post-operative daily activities, which was 78.76 ± 5.42 .

Conclusion

Clinical results show the superiority of regional anesthesia over general anesthesia in the management of patients during and after the surgical procedure for patients with shoulder fractures because of its advantages of providing comfortable and appropriate analgesia, promoting a decrease in the rate of complications and pain, reducing the duration of surgery, accelerating the duration of recovery and follow-up, and reducing the rate of stay in hospital, postoperative hospitalization, which enhances the improvement of patient outcomes and reduces the mortality rate for postoperative patients.

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