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ANAESTHETIC TECHNIQUES FOR ORTHOPAEDIC SURGERIES IN BENUE STATE UNIVERSITY TEACHING HOSPITAL (BSUTH), MAKURDI, NIGERIA

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ABSTRACT

Background: Orthopaedic surgery entails operating on osseous and non-osseous structures of the limbs, spine and joints of the body. Like all other surgeries, orthopaedic surgeries require the administration of anaesthesia to patients. Central neuraxial blocks for lower limb surgeries has gained worldwide acceptance because it has lower mortality rates, shorter hospital stay, reduced patient cost and decreased in-hospital complications. General anaesthesia (GA) and regional anaesthesia (RA) have been used successfully for upper extremity orthopaedic procedures. It is also the technique of choice in the paediatric age group, the critically ill patients as well as being use for upper limb surgeries. This study was undertaken to ascertain the anaesthetic techniques employed in orthopaedic surgeries in the Benue State University Hospital, Makurdi. **Methodology:** A total of 117 case files of eligible patients were retrieved from the records department. Relevant information were extracted from the patients' folders and transferred into a prepared proforma. Data collected were analyzed using SPSS version 25 using simple statistics. **Results:** A total of 117 orthopaedic surgical cases were evaluated. The age bracket with the most number is that between 21 t0 30 years with 28 making up 23.9% of the study population. Eighty-five patients were male, accounting for 72.6% of the study population, while 32 were female, making up the remaining 27.4%. Most of the patients were between ASA II and ASA III with 47 (40.2%) and 45 (27.4%). A total of 131preoperative diagnosis were made either singly or in combination with the two most common indications for surgery being femoral fracture and tibial fracture with 23 and 20 accounting for 17.3% and 15.0% of the variables. Of the total of 125 surgical procedures that were undertaken in this study, open reduction and internal fixation (ORIF) were carried the most, recording 35 accounting for 28.0% of the variables. Similarly, of the total of 117 anaesthetic procedures that were undertaken, sub-arachnoid block (SAB) was employed 65 times accounting for 55.6% of the variables.. Also, of the 13 episodes of complications that were recorded, hypotension was the most common having been recorded 7 times accounting for 53.8% of the variables. Again, of the 16 management modalities employed for the management of complication of the anaesthetic technique intravenous administration of ephedrine was carried out 5 times representing 31.3% of the variables. **Conclusion:** This study has demonstrated that regional anaesthesia is the most common anaesthetic technique used in this centre, mostly with the employment of SAB. GA is still being utilized mostly for children and upper limb surgeries. Training of personnel and the provision of modern equipment that aid regional technique will change the equation further in favour of these desirable techniques. That is where the world is going.

INTRODUCTION

Orthopaedic surgery entails operating on osseous and non-osseous structures of the limbs, spine and joints of the body. Like all other surgeries, orthopaedic surgeries require the administration of anaesthesia to patients. Anesthetic techniques employed vary depending on the surgical procedures involved, age of the patient and the expertise of the anaesthetist. At present, there is an increasing trend towards the use of regional anaesthesia for upper and lower limb orthopedic surgeries.[1]

Central neuraxial blocks for lower limb surgeries has gained worldwide acceptance because it has lower mortality rates, shorter hospital stay, reduced patient cost and decreased in-hospital complications.[1,2,3] Furthermore, it improves post-operative pain control, reduces intraoperative bleeding, does not require endotracheal intubation and mechanical ventilation, thus improving the overall surgical outcome.[4]

General anaesthesia (GA) and regional anaesthesia (RA) have been used successfully for upper extremity

orthopaedic procedures.[5,6] Nerve block anaesthesia is cheaper than GA and has many advantages such as anaesthesia targeted at the operative site, excellent postoperative pain relief, decreased opioid use and reduced recovery time.[7,8] A study even reported a predominant use of general anaesthesia (84%) for upper extremity surgeries.[9]

General anesthesia is the most routinely used technique for spinal surgeries.[10] It is also the technique of choice in the paediatric age group, the critically ill patients as well as being used for upper limb surgeries. Non-availability or cost of equipment and materials for regional blocks often compel anaesthetists to resort to the use of GA even in situations where regional techniques could have been utilized.[11]

This study was undertaken to ascertain the anaesthetic techniques employed in orthopaedic surgeries in the Benue State University Hospital, Makurdi.

METHODOLOGY

Study Design

This was a three year retrospective study carried out in BSUTH, Makurdi, a 360 bed hospital situated in the capital city of Benue Sate, North Central of Nigeria.

Ethical Considerations

The approval of the BSUTH research and ethical committee was sought and obtained.

ELIGIBILITY

Inclusion Criteria

All patients who underwent elective orthopaedic procedure in the BSUTH orthopaedic theatre between January 2016 and December 2018 were evaluated.

Exclusion Criteria

All patients who underwent surgeries other than orthopaedic were excluded.

PROCEDURE

Case files of eligible patients were retrieved from the Records Department of BSUTH after an application to the department was approved. Relevant information were extracted from the patients' folders and transferred into a prepared proforma. The data collected include age, sex, American Society of Anesthesiologists physical status classification (ASA) pre-operative diagnosis, existence or otherwise of co-morbidity, surgical procedure undertaken, type of anaesthetic technique used as well as complications emanating from the technique employed and how they was managed. The data so collected were analyzed using SPSS version 25 using simple statistics.

RESULTS

A total of 117 orthopaedic surgical cases were evaluated.

Age distribution

The age bracket with the most number is that between 21 and 30 years with 28 making up 23.9% of the study population. This is followed by the age between 31 and 40 years with 21 accounting for 17.9% of the study population. The age groups between 41 and 50 years, 51 and 60 years, 11 to 20 years, 0 to 10 years as well as 61 to 70 recorded 19 (16.2%), 17 (14.5%), 11 (9.4%), 10 (8.5%) and 10 (8.5%) respectively. Only 1 patient was recorded in the age between 70 and 80 years which is 0.9% of the study group. (Tab 1)

Sex distribution

Eighty-five patients were male, accounting for 72.6% of the study population, while 32 were female, making up the remaining 27.4%.

ASA classification

Most of the patients were between ASA II and ASA III with 47 (40.2%) and 45 (27.4%). The other classifications recorded were ASA I with 20 (17.1%) and ASA IV with 5 (4.3%). (Fig 1)

Preoperative diagnosis

A total of 131preoperative diagnosis were made either singly or in combination of which the two most common indications for surgery were femoral fracture and tibial fracture with 23 and 20 accounting for 17.3% and 15.0% of the variables. Chronic osteomyelitis follows with 7 (5.3%). Fibular fracture, avascular necrosis (AVN) of the head of femur and non-union were made 6 times making up 4.5% of the variables each. Preoperative diagnosis made 5 times making up 3.5% of the variables each include ulnar fracture, humeral fracture, ankle fracture, osteoarthritis and osteosarcoma. While toe gangrene was made 4 times (3.0%), diabetic foot, metacarpal fracture and hip dislocation were made 3 times (2.3% each). Similarly, diagnosis of radial fracture, patellar fracture and septic arthritis were made 2 times accounting for 1.5% of the variables. (Tab 2)

Co-morbidities

A total of 31 co-morbidities were seen. Of these, the most common co-morbidity observed is systemic arterial hypertension with 13 making up 41.9% of the variables. This is followed by diabetes mellitus and sickle cell disease with 7 accounting for 22.6% each. Retroviral disease (RVD) was observed twice making up 6.5%. Finally, both peptic ulcer disease and hepatitis C virus infection occurred once each representing 3.2% each.

Surgical procedures

A total of 125 surgical procedures were undertaken in this study. Out of these, open reduction and internal fixation (ORIF) were carried the most, recording 35 accounting for 28.0% of the variables. Amputation comes second with 10 making up 8.0%. This is followed by linear rail system (LRS) 7 (5.6%), K-wiring 6 (4.8%) and sequestrectomy 5 (4.0%). Procedures that were undertaken 4 times making up 3.2% of the variables

each, include stump refashioning, total hip replacement and ankle reconstruction. Similarly, cord decompression, hemi-arthroplasty, arthrodesis, total knee replacement, plaster of Paris application, skeletal traction and incisional biopsy were carried out 3 times accounting for 2.4% of the variables. Furthermore, open reduction and external fixation (OREF), debridement, intra-medullary nailing, girdle stone procedure and arthrostomy were undertaken 2 times making up 1.6% of the variables each. (Tab 3)

Anaesthetic techniques employed

A total of 117 anaesthetic procedures were undertaken. Out of these, sub-arachnoid block (SAB) was employed 65 times accounting for 55.6% of the variables. This was followed by general anaesthesia with tracheal intubation and general anaesthesia with face mask being used 28 times and 19 times making up 23.9% and 16.2% respectively. Also, while combined spinal and epidural (CSE) was use 2 times (1.7%), local infiltration, axillary block and femoral block were utilized once accounting for 0.9% of the variable each. (Fig 2)

Complications of anesthetic techniques

Thirteen episodes of complications were recorded. Out of these, hypotension was the most common having been recorded 7 times accounting for 53.8% of the cases. Other complications include pain 5 (38.5%) and bradycardia 1 (7.7%). (Fig 3)

Management of complications of anaesthetic techniques

Sixteen management modalities were employed singly or in combination. Of these, intravenous administration of ephedrine was carried out 5 times representing 31.3% of the variables. This was followed by the administration of intravenous pentazocine with 4 (25.0%), intravenous ketamine with 3 (18.5%) and intravenous paracetamol with 2 (12.5%).

Table 1: The distribution of patients according to age groups (n=117).

Variable	Frequency	Percentage (%)
Age		
0-10	10	8.5
11-20	11	9.4
21-30	28	23.9
31-40	21	17.9
41-50	19	16.2
51-60	17	14.5
61-70	10	8.5
71-80	1	0.9

Table 2: Diagnoses.

Preoperative diagnoses (multiple variable n=131)

Variable	Frequency	Percentage (%)
Diagnoses		
Femoral fracture	23	17.3
Tibial fracture	20	15.0
Chronic osteomyelitis	7	5.3
Fibular fracture	6	4.5
AVN of femoral head	6	4.5
Non-union	6	4.5
Ulnar fracture	5	3.5
Humeral fracture	5	3.5
Osteoarthritis	5	3.5
Osteosarcoma	5	3.5
Ankle fracture	5	3.5
Toe gangrene	4	3.0
Diabetic foot	3	2.3
Metacarpal fracture	3	2.3
Hip dislocation	3	2.3
Radial fracture	2	1.5
Patella fracture	2	1.5
Septic arthritis	2	1.5
Others	19	14.3

KEY: AVN- avascular necrosis

Table 3: Surgical Procedure (multiple variable n-=125).

Variable	Frequency	Percentage (%)
Procedure		
ORIF	35	28.0
Amputation	10	8.0
External fixation	8	6.4
LRS application	7	5.6
K-wiring	6	4.8
Sequestrectomy	5	4.0
Stump refashioning	4	3.2
THR	4	3.2
Ankle reconstruction	4	3.2
Cord decompression	3	2.4
Hemi-arthroplasty	3	2.4
Arthrodesis	3	2.4
TKR	3	2.4
POP application	3	2.4
Skeletal traction	3	2.4
Incisional biopsy	3	2.4
OREF	2	1.6
Debridement	2	1.6
IM nailing	2	1.6
Girdlestone procedure	2	1.6
Arthrostomy	2	1.6
Others	11	8.8

KEY: ORIF-open reduction and internal fixation, LRS-linear rail system, THR-total hip replacement, TKR-total knee replacement, POP-plaster of Paris, OREF-open reduction and external fixation, IM-intramedullary.

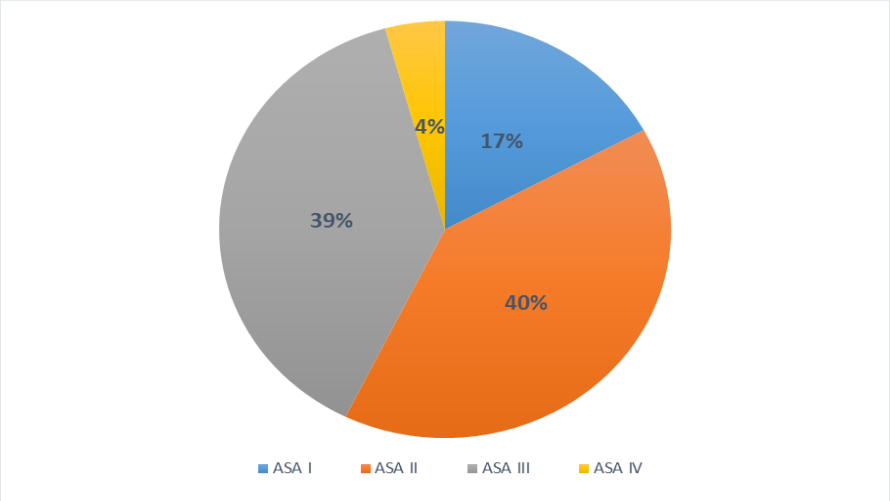

Figure 1: Pie chart illustrating ASA classification of patients (n=117).

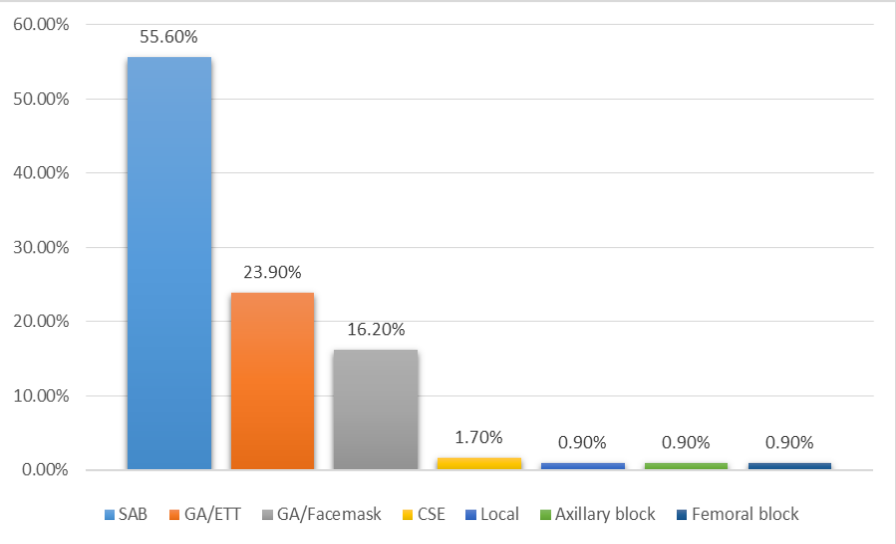

Figure 2: Bar chart showing anaesthetic techniques (n=117).

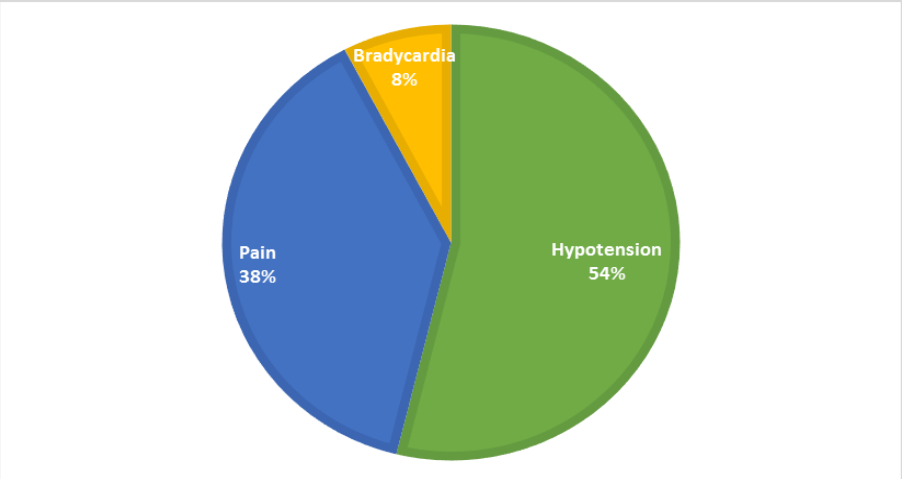

Figure 3: Pie chart showing complications of anaesthetic procedure (n=13).

DISCUSSION

Grossly, there does not appear that there is a dominance of any age group in the study population. However, the age bracket with the most number is that between 21 t0 30 years with 28 making up 23.9% of the study population. Over three quarters (75.9%) of the study population were aged between 0 and 50 years. This figure demonstrates that the disease conditions

warranting orthopaedic surgery occur more with the youth. As will be demonstrated later, fractures were the commonest indication for orthopaedic surgery. In our environment, most fractures result from road traffic accident and they occur in active and highly mobile people like the youth.

With regards to the sex distribution, the male gender accounted for 72.6% of the study population with the female gender making up the remaining 27.4%. Again, just as observed with the youth above, men are not only more mobile, but are also more active and thus more prone to road traffic accident than their female counterparts.

Concerning American Society of Anesthesiologists physical status classification (ASA), most of the patients were between ASA II and ASA III (40.2%) and (27.4%). ASA I (17.1%) come next while ASA IV (4.3%) is negligible. The predominance of ASA II would be as a result of the common co-morbidities of hypertension and diabetes mellitus. Multiple injured patients, the elderly and those with cancers are those likely to present with ASA III and IV.

A total of 131preoperative diagnosis were observed either singly or in combination Of these, the two most common indications for surgery were femoral fracture and tibial fracture accounting for 17.3% and 15.0% of the variables. From the result of this study, fractures of long bones such as femur, tibia, fibular, radius and ulnar accounted for 43.8% of the variables. Long bones are by their nature, more prone to fractures.

Out of the 125 orthopaedic surgical procedure carried out, open reduction and internal fixation (ORIF) accounted for 28.0% of the variables. This is unexpected giving the preponderance of fractures as indications for surgery. In addition, poorly managed fractures resulting in malunion and nonunion end up in a tertiary institution like ours and invariably involve in the employment of ORIF as a procedure.

Out of a total of 125 anaesthetic procedures, sub-arachnoid block accounted for 55.6% of the variables. This was followed by general anaesthesia with tracheal intubation and general anaesthesia with face mask making up 23.9% and 16.2% the variables respectively. In addition to SAB, when the usage of other regional blocks such as combined spinal epidural, local infiltration, axillary block and femoral block are summed up, regional block in this study accounted for 60% of the anaesthetic procedures. In our centre, most lower limb surgeries are undertaken under regional anaesthesia especially sub-arachnoid block. GA on the other hand, is employed in the paediatric age group, the critically ill and for upper limb surgeries, with peripheral nerve blocks rarely used. Adegboye et al[11] in their study also reveals a low utilization of regional blocks due to lack of equipment for peripheral nerve blocks such as the nerve stimulators and block needles which are either not available or are too expensive. When bone grafts were to be harvested from another part of the body e.g. the iliac crest the use of general anesthesia is usually the anesthetic technique of choice in their center. This is equally true with our own centre.

The use of regional anesthesia for upper limb orthopedic surgeries is greatly desirable because it has benefits such as improve postoperative pain relief, decreased opioid consumption, reduced recovery time and reduced hospital stay.[12,13] Intravenous regional anesthesia (Bier's block), is not employed here due to non-availability of the double tourniquet system. Same was observed by Adegboye et al.

The high rate of spinal recorded in this study is in agreement with the study by Adegboye et al[11] in which out of the 81% of the regional anesthesia performed for the lower limb surgeries, 54.7% were done under spinal anesthesia. This finding is also similar to that of Obasuyi et al[9] Rukewe and Fatiregun[14], Schnittger[15] and Rosenberg.[16]

Hypotension was the most common complication recorded accounting for 53.8% of the variables. This usually associated with the use of SAB. Administration of local anaesthetic agent into the sub-arachnoid space results in sympathetic block below the block level. This in turn gives rise to pooling of blood in the lower extremities thereby reducing the cardiac output. The resultant effect is a reduced blood pressure. Accordingly, the commonest modality for the management of complications in this study is the administration of intravenous ephedrine.

CONCLUSION

This study has demonstrated that regional anaesthesia is the most common anaesthetic technique used in this centre, mostly with the employment of SAB. GA is still being utilized mostly for children and upper limb surgeries. Training of personnel and the provision of modern equipment that aid regional technique will change the equation further in favour of these desirable techniques. That is where the world is going.

Conflict of interest

None.

REFERENCES

1. Khanduri K.C.: Regional anesthesia techniques for orthopedic surgery. MJAFI, 2008; 64(2): 108-110.
2. Memtsoudis S.G., Sun X., Chiu Y.L., et al.: Perioperative comparative effectiveness of the anesthetic technique in orthopedic patients. Anesthesiology, 2013; 118(5): 1046-1058.
3. Neuman M.D., Silber J.H., Elkassabany N.M., et al.: Comparative effectiveness of regional versus general anesthesia for hip fracture surgery in adults. Anesthesiology, 2012; 117(1): 72-92.

4. Parker M.J., Handoll H.H., Griffiths R:. Anesthesia for hip fracture surgery in adults. Cochrane Database Syst Rev., 2004; 4: CD000521.
5. Hadzic A, Arliss J, Kerimoglu B, Karaca PE, Yufa M, et al. A Comparison of Infraclavicular Nerve Block versus General Anesthesia for Hand and Wrist Day-case Surgeries. Anesthesiology, 2004; 101: 127– 32.
6. Mariano ER, Chu LF, Peinado CR, Mazzei WJ. Anesthesia-controlled time and turnover time for ambulatory upper extremity surgery performed with regional versus general anesthesia. J Clin Anesth, 2009; 21: 253-7.
7. Maga JM, Cooper L, Gebhard RE. Outpatient regional anesthesia for upper extremity surgery update (2005 to present) distal to shoulder. Int Anesthesiol Clin., 2012; 50: 47-55.
8. Ilfeld BM, Wright TW, Enneking FK, Vandenborne K. Total elbow arthroplasty as an outpatient procedure using a continuous infraclavicular nerve block at home: a prospective case report. Reg Anesth Pain Med., 2006; 31: 172-6.
9. Obasuyi BI, Alagbe-Briggs OT, Echem RC. Choice of anaesthesia for orthopaedic surgeries in a developing country: How appropriate? Journal of Medicine and Medical Sciences, 2013; 4: 101-106.
10. Attari M.A., Mirhosseini S.A., Honarmand A., et al.: Spinal anesthesia versus general anesthesia for elective lumbar spine surgery: A randomized clinical trial. J Res Med Sci., 2011; 16(4): 524-529.
11. Adegboye MB, Kadir DM, Josiah C. Anaesthesia for orthopaedic surgeries in two tertiary institutions in north central Nigeria. J Orthop Trauma Surg Rel Res., 2018; 13(3).
12. Clarke P.M.: Local anesthetic blocks in ambulatory orthopedic surgery. Anaesth Intensive Care., 2003; 84-89.
13. Anand L.K., Jindal R.: Regional anesthesia for upper extremity in orthopedics: a review article. Punjab J Orthopaedics, 2009; 11: 1-8.
14. Rukewe A., Fatiregun A.: The use of regional anesthesia by anesthesiologists in Nigeria. Anaesth Analg, 2010; 110: 243-247.
15. Schnittger T.: Regional anesthesia in developing countries. Anesthesia, 2007; 6(1): 44-51.
16. Rosenberg P.H.: Future of regional anesthesia. Acta Anaesthesiol Scand, 2005; 49: 913-921.