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# Surgeon Administered Regional Anaesthetic Blocks For Hand Surgery In Resource Limited Areas

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## Abstract

**Introduction:** The axillary block was described more than sixty years ago and has since been used in a variety of scenarios. Recently it has been described with the use of ultrasound and nerve stimulators. These facilities are not available in resource limited areas.

**Methods:** We describe the simple, but effective, perivascular axillary block technique we have used for regional anaesthetic blocks for hand surgery. We also undertook a prospective cohort study of all patients undergoing hand surgery under this regional block technique at Mulago Hospital. We abstracted the drug and dosage used, delay in onset of action and duration of action data for each patient. We excluded

patients younger than 12 years. All cases with attempted blocks were included.

**Results:** The success rate of the procedure was 77.8%. The mean delay in onset of action was 20 minutes with an average duration of action of 99 minutes. The commonest drug used was Mepivacaine with a mean dosage of 333.3mg.

**Discussion and conclusion:** This technique is reliable with a high success rate. It has few complications and can be used in areas without ultrasound or nerve stimulators.

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## Introduction

The axillary approach to anaesthetising the brachial plexus has been used for over half a century(1). Since the perivascular approach was described, it has gained popularity and is used for operative anaesthesia, emergency room manipulations and for pain free upper limb physiotherapy(2-4). Recent techniques have been developed using ultrasound and nerve stimulators to increase the accuracy of the technique(5, 6). These facilities are not widely available in resource limited settings. We describe a perivascular technique that can be used in resource limited areas. This will acquaint surgeons who have previously used only general anaesthesia for hand surgery with a technique that has served well for many years even in places without ultrasound and nerve stimulators. We aim to describe the technique and showcase its use in a number of hand surgical cases.

## Methods

The method of achieving anaesthesia is described. The patient lies supine with the arm abducted and externally rotated to expose the axilla. The axillary artery is palpated in the axilla and marked with a marker pen. The skin of the axillary area is prepared with alcohol mixed with iodine. The surgeon dons sterile gloves and palpates for

the axillary artery guided by the mark previously made. A gauge 25 needle is introduced adjacent to the pulsations of the artery. Vascular penetration is indicated by blood flowing back through the needle. Should this happen, the needle is repositioned as to have the needle adjacent to the artery in the axillary sheath. This will be evidenced by a pulsatile needle without any blood flowing back. The chosen local anaesthetic is then instilled through the needle. The surgeon aspirates every 5mls to ensure the needle is not in a vessel. Correct needle placement in the axillary sheath is confirmed by a characteristic resistance to the instillation of the local anaesthetic and by back flow of local anaesthetic through the needle when the syringe is removed. A tourniquet may be used after the first 20mls have been instilled to ensure proximal flow of the anaesthetic in the sheath ensuring a more profound block. Take of the block is assessed by evaluating the motor and sensory functions of the nerves of the upper limb.

We reviewed details of nine patients who underwent hand surgery under the regional block described at the Mulago Hospital. We excluded patients under the age of 12 years. The regional block was administered by the surgeon and intraoperative monitoring by an anaesthetic officer. The delay in onset of anaesthesia was determined

as the time from instillation of anaesthetic drug to complete anaesthesia of the surgical site. The duration of surgery was measured from skin incision to skin closure and dressing. In cases of failure of the regional block, the patient was put under general anaesthesia by the anaesthetic officer. An axillary block was determined as successful if the entire surgery was conducted under the block without need for supplementation or conversion to either general surgery or the tumescent technique. Patients in whom there was no take were operated either under general anaesthesia or the tumescent technique. The data on age, procedure, delay and duration of surgery was inputted into a computer and analysis conducted using Microsoft Excel software.

## Results

Six of the nine patients undergoing ten procedures were males (Table 1). The median age of the patients was 25 years (Range 12-27 years). The procedures included tendon repairs, carpectomies and fixation for hand fractures (table 1). The block was successful in 7 patients giving a success rate of 77.8%. In all cases the drug used was Mepivacaine 1% with an average dosage and volume of 333.3mg and 33.3millilitres respectively. The two cases in this study that failed were due to failure to palpate the artery in one and the use of a wide needle in the other. The average delay in onset was 20 minutes (Range 14-27) while the average duration of surgery was 99 minutes (Range 55-180)

## Discussion

The reported rates of success with the perivascular axillary block technique have varied from centre to centre, although generally high (7). A study in Germany reported a success rate of 72% without the use of ultrasound while in Croatia they were able to report successful anaesthesia in 85% of patients(8, 9) Our success rate closely matches this but we are confident that the success rate will improve with subsequent patients. Success rates as high as 98% have been described and are achievable(10).

The technique described has fewer complications than other techniques used for upper limb surgery. Of note is the risk of pneumothorax which does not occur with this technique but has been reported with the supraclavicular approach (7). It seems that with the use of ultrasound and nerve stimulators, this risk is somewhat

**Table 1: Procedures performed using perivascular axillary block**

Procedure Done	Number	Percentage
Tendon Repair	3	30%
Proximal Row Carpectomy	2	20%
ORIF distal Forearm	5	50%

reduced(11). These facilities are however not available in resource poor settings. It is hence safer to use the perivascular technique.

There is a risk of intravascular injection with this perivascular technique and this has been touted as one of the advantages for the use of ultrasound. However it has been found that this is not the case and intravascular injection may still occur despite the use of ultrasound(12). This technique has the advantage that it can be used even in areas where the anaesthesia provider is not conversant with the technique as the surgeon will administer the block and leave the intraoperative monitoring to the anaesthetic provider.

## Conclusion

The described perivascular technique is reliable and safe and can be used in areas with limited resources.

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## CASE REPORT

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