

# Axillary Brachial Block For Upper Limb Surgery: A Study Of 100 Consecutive Patients

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## SUMMARY:

**Aim:** To determine the overall clinical success rate and degree of patient satisfaction with axillary brachial plexus blocks for upper limb surgery.

**Patients and Methods:** One hundred consecutive adult patients scheduled for hand or forearm surgery were prospectively studied. The brachial plexus was blocked via the axillary route with 40ml of 1% lidocaine. The clinical success rate was defined as the number of patients whose anaesthesia was adequate for surgery. A questionnaire was given to each patient at discharge to complete and return during the first post-operative review in the surgical outpatient clinic.

**Results:** The overall clinical success rate was 95%. Complete anaesthesia distal to the elbow was achieved in 80% of patients. Patient satisfaction was high (96%).

**Conclusion:** Axillary brachial plexus block is a safe, reliable technique for surgery on the forearm and hand, with a high level of patient satisfaction. This block should be considered the technique of choice for forearm and hand surgery.

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**KEY WORDS:** Regional Anaesthesia, Axillary brachial plexus, Upper Limb Surgery

## INTRODUCTION:

The brachia plexus has its roots from C5, 6, 7, 8 and T1. It can be blocked by the cervical, supraclavicular, or axillary route.

The axillary approach is relatively simple and is associated with less serious complications. Axillary brachial plexus block (ABPB) provides good analgesia for surgery below the elbow. Successful axillary brachial plexus block depends on accurate identification of the axillary sheath<sup>1</sup>. Many approaches to identifying the axillary sheath have been described including eliciting paraesthesia, arterial puncture or loss of resistance prior to local anaesthetic injection and palpation of the axillary artery. None has proved superior to others in randomized clinical trials<sup>2-4</sup>.

In addition, the success rate of ABPB depends on how success is defined. Many authors define a successful block as one adequate for surgery<sup>5,6</sup>.

The author decided to audit prospectively 100 consecutive patients scheduled for hand or forearm surgery to determine (1) the overall clinical success rate and (2) the degree of patient satisfaction with axillary brachial plexus block.

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## PATIENTS AND METHODS:

One hundred consecutive patients presenting for surgery on the elbow, forearm or hand, under axillary brachial plexus block were prospectively studied. All patients gave informed consents for anaesthetic procedures and also consented to complete a post-operative questionnaire.

As this work was an audit of our usual practice and the technique was not different from our usual technique, institutional ethical committee approval was not sought.

## Protocol

The patients fasted for 6 hours before surgery. No premedication was given. A vein in the non-operative arm of each patient was cannulated for fluid and drug administration, and arterial blood pressure, heart rate and oxygen saturation were monitored continuously with pulse oximeter.

Patient lay supine, head turned opposite the side to be blocked. The arm to be blocked was abducted to a right angle, externally rotated and flexed at the elbow. A rubber tourniquet was applied in the proximal end of the upper arm to limit the distal spread of the local anaesthetic.

The axillary was prepared with alcoholic chlorhexidine solution after which the axillary artery was palpated and fixed between the index and middle fingers of the left hand. A 22 gauge needle was inserted by the right hand through the skin into the axillary sheath, close to the axillary artery. Free oscillation of the needle in resonance with arterial pulsation was positive sign that the needle was in the axillary sheath.

Once the sheath was identified 40mls of 1% lidocaine with epinephrine 1:200,000, was injected slowly. Loss of cutaneous temperature discrimination in the upper limb was tested with ice block 15 minutes after injection of the local anaesthetic.

At discharge, each patient was given a questionnaire to complete and return during the first post-operative review (Table 1).

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**Table 1: Postoperative patient questionnaire:**

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Question 1:	Did you have any pain, severe tenderness or bruising in your armpit following your operation?
Question 2:	Did you notice any change in feeling in your arm or hand following the surgery (apart from the pain due to the operation)?
Question 3:	Was your arm blocked satisfactorily
Question 4:	Would you have another arm block if you needed more surgery?

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**Data analysis:** The clinical success rate was defined as the number of patients whose anaesthetic was adequate for surgery. Results are presented as mean (SD).

### RESULTS:

One hundred patients presenting for upper limb surgery were studied prospectively over a 12-month period. Their ages range from 17 to 18 years with a mean of 47 (17). Although patients were generally healthy, their weights varied widely (40 to 120kg) (Table 2).

**Table 2: Demographics**

Axillary brachial plexus block (n = 100)	
Age (yr)	47 (17)
Weight (kg)	72 (19)
Male (%)	55
Female	45
ASA Status (%)	
I	74
II	23
III	3
Site of surgery (%)	
Hand	50
Wrist	35
Forearm	10
Elbow	5

ASA = American society of Anesthesiologists (physical status)

Results are presented as means (SD).

All successfully blocked patients were conscious during surgery and none required airway support.

**Success rate:** The clinical success rate of ABPB was 95%. This means that 95 out of the 100 patients had ABPB adequate for surgery. Onset of surgical anaesthesia/analgesia was 5-10 mins of the duration was 90-120 minutes in all the cases. Average duration of surgery was 45 minutes (10 – 90 minutes). Of the remaining 5 patients, 2 had local infiltration with 1% lidocaine and epinephrine 1:200,000. Three patients had insufficient sensory and motor block for surgery and required general anaesthesia with atropine, ketamine and diazepam.

**Patient satisfaction:** Patient satisfaction with ABPB in this patient group was high: 96% of those responding to the questionnaire were satisfied with their anaesthetic and they were all willing to have another arm block. Four patients reported dissatisfaction with their anaesthetic. The reasons were as follows: (1) failed arm block requiring general anaesthesia; (2) discomfort from the plaster; and (3) a sensation of "thick arms".

These 4 patients were unwilling to have another LA block of the limb.

### DISCUSSION

The clinical success rate of axillary brachial plexus block was 95%. This result is similar to other reports despite variations in techniques (99%, 93 & 84%<sup>2-4</sup>). The overall clinical success rate was increased to 97% by local infiltration. Local infiltration and/or peripheral nerve blocks are commonly employed to increase the success of axillary brachial plexus block. For example, Yousseff and Desorand<sup>3</sup> reported only 60% success rate, improved to 76% by peripheral nerve blocks, and Fleck et al<sup>7</sup> reported a 65% clinical success rate, improved to 90% by field blocks. Pearce et al<sup>8</sup> believed that peripheral nerve blocks or local infiltrations are an essential ancillary technique when performing axillary brachial plexus blocks, as incomplete block of one or more peripheral nerves is very common.

The high clinical success rate recorded in this study was due to accurate identification of the axillary sheath before the injection of local anaesthetic agents. Axillary sheath entry was identified by free oscillation of the needle with arterial pulsation.

Patient satisfaction with axillary brachial plexus block in this study was high. Ninety-six percent of those responding to the questionnaire were satisfied with their anaesthetic. The high rate of patient satisfaction in this study was similar to other reports (93 – 98%<sup>9-12</sup>) and resulted in part from the relatively painless needle puncture and the use of ice block rather than a pain. Which may cause apprehension, for mapping the block.

In this audit it has been demonstrated that axillary brachial plexus block is highly reliable particularly when supplementary local infiltrations or peripheral nerve blocks are used. The block is safe, easy to perform and should be considered the technique of choice for forearm and hand surgery. The implication of the findings of this study is that anaesthetists and surgeons should know that ABPB is an excellent alternative to general anaesthesia for day-case surgery on the forearm and hand. The use of ABPB by passes many of the potential sources of minor and major morbidity associated with general anaesthesia such as trauma to the lips, teeth, pharynx, vocal cords; bronchospasm; aspiration; and potential adverse responses to general anaesthetic drugs.

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