

# Ultrasound Guided Axillary Brachial Plexus Catheter in a Patient with Severe Hemophilia

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## Summary

We report a case of uncomplicated axillary catheter placed under ultrasound guidance in a patient with severe hemophilia. This catheter, inserted when the patient was fully substituted with factor VIII, was indicated for postoperative physiotherapy after elbow arthrolysis. Ultrasound control showed no local bleeding. Withdrawal was uneventful. Efficient analgesia allowed intensive elbow mobilization.

## Case Report

### Introduction

Ultrasound-guidance may help anesthesiologists to perform regional anesthesia in special situations. Bigeleisen reported an uncomplicated infraclavicular block under ultrasound guidance, in a patient having received 5000 U of heparin 2 h before the block [1]. Even if a recent report reminds us that vascular puncture remains still possible during ultrasound guided nerve blocks [2], cases have reported a reduction of this risk using ultrasound. Hemophilia is usually considered as a contra-indication for regional anesthesia. Very few data are available about regional anesthesia in hemophiliacs, and we found only one case that reports the placement of an axillary catheter in a hemophiliac [3]. We report here one case of an uncomplicated continuous axillary catheter placed in a hemophiliac under ultrasound guidance.

### Case report

A 24-yr-old man (height: 171 cm, weight: 75 kg) with severe hemophilia A (factor VIII (FVIII) activity level of less than 1% of normal) with inhibitor (0.7 Bethesda Units) was scheduled for right elbow synovectomy, arthrolysis and radial head resection. His past medical history was only remarkable for hemophilia and hepatitis C. General Anesthesia and multimodal analgesia with PCA morphine, paracetamol and nefopam were planned.

Ninety minutes before surgery, the patient received 5000 IU of intravenous FVIII (Advate®, recombinant antihemophilic A factor, Baxter, Maurepas, France) as a loading dose, followed by a continuous infusion of Advate® 500 IU/hour maintained until the end of surgery. Preoperative control showed that the FVIII was 129%, and surgery was begun. General anesthesia induced with sufentanil, propofol and atracurium for tracheal intubation, was maintained with sevoflurane in 50% nitrous oxide and 50% oxygen. Surgery lasted 2 hours. Intravenous paracetamol (1 g), and nefopam (40 mg) were injected 45 min before the end of surgery. In the PACU, the patient was very painful with a VAS pain rating 8 to 10. Morphine titration, 21 mg in 15 minutes, was poorly effective. Furthermore, surgeons and physiotherapists wished immediate active and passive mobilization of the elbow. According to our experience in total knee replacement showing that only continuous peripheral nerve catheters can achieve the objective of painless physiotherapy, we decided, after patient informed consent, to place an axillary catheter. The main problem for physiotherapy was a reduced flexion of the elbow, while extension was only partly reduced. To improve postoperative physiotherapy it was crucial to block the radial nerve. Ultrasound guidance was proposed to minimize the risks

of vascular puncture. A short axis sonogram of the axilla revealed a classical anatomic organization as described by Retzl et al. with the radial nerve located in the lateral lower quadrant [4]. After turning the probe (Micromax®, Sonosite®, Bothell, WA, USA) clockwise, a long axis sonogram of the radial nerve was obtained. Under strict sterile conditions, i.e., sterile draping, surgical dressing, sterile covering of the probe (Civflex®, Civco, Kalona, Iowa, USA) and guided by nerve stimulation, a stimulating catheter (Stimulong, Pajunk, Geisingen, Germany) was placed through a 50 mm long Tuohy tipped needle. The nerve stimulator was set at 1 Hz, 100 µs and 1 mA and settings were unchanged during the insertion procedure. The radial nerve was carefully approached following the in plane approach as the nerve was visualized in its long axis view. A typical radial motor response (finger extension) was obtained while the needle was gently touching the nerve. The stimulating catheter was introduced through the needle and the hyperechoic stimulating tip of the catheter was easily visualized in the axilla. Ten centimeters of the catheter were introduced cephalad while finger extension was maintained at a stimulating intensity of 0.60 mA. After a 3 ml test dose of 20 mg/ml lidocaine+15 µg epinephrine, 100 mg of ropivacaine in 20 ml were slowly injected. The catheter was wrapped in transparent dressings. No immediate bleeding was evident. Pain rapidly decreased and 30 minutes after, the VAS was 0/10, and a continuous infusion of ropivacaine 2 mg/ml was maintained with an initial rate of 6ml/h.

After two hours in the PACU, axilla examination revealed no bleeding, no bruising and nor hematoma. The patient was discharged to the ward. Clinical follow up every 4 hours was negative for local complication. On the first postoperative day, as the sensory block was complete for the radial and ulnar nerves, and almost complete for the median nerve, a sonogram and a dye control were obtained searching for a hematoma. The sonogram of the axilla was normal without any sign of hematoma or abnormal fluid collection in the axilla. The hyperechoic stimulating probe was visualized at the posterior part of

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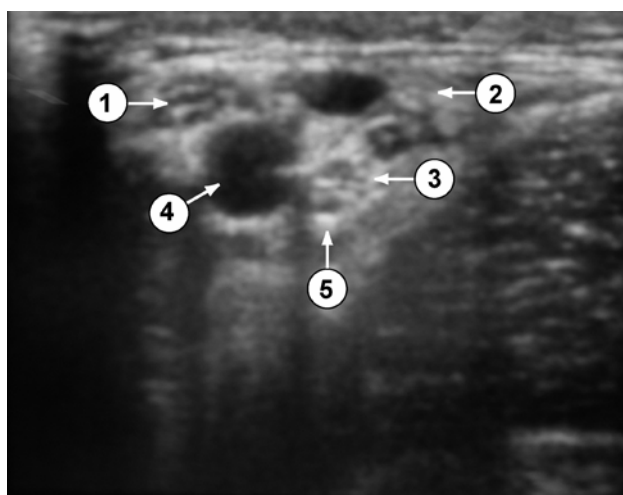
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the radial nerve (Figures 1 and 2). Dye control showed a homogenous opacification of the brachial plexus space without evidence of a hematoma (Figure 3). The infusion was stopped for 6 hours. After evidence of sensory block regression, infusion was restarted with at 4 ml/h.

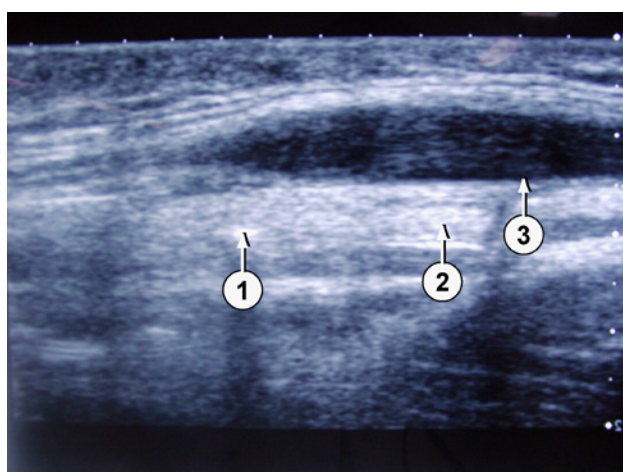
During the first five postoperative days, pain scores were low, with ratings between 0 and 3/10, and maximum during forced passive physiotherapy. Only oral paracetamol was needed. The catheter was maintained for 5 days without any detectable local complications. It was withdrawn while the patient was still substituted with factor VIII. No bleeding was observed at that time. FVIII activity was closely controlled by the hematologist and maintained between 85 and 110%. The patient was discharged on D10. Later clinical follow up by the surgeon revealed no local complication.

## Discussion

Guidelines for regional anesthesia do not provide any



**Figure 1:** Short axis sonogram of the axilla obtained on POD1. The median (1), ulnar (2) and radial nerves (3) are placed around the axillary artery (4). The hyperechoic probe of the catheter is located below the radial nerve (5).



**Figure 2:** Long axis sonogram of the axilla obtained on POD1. The hyperechoic probe (1) of the stimulating catheter is visible below the radial nerve (2). The basilic vein (3) is above the radial nerve. No hematoma or collection is evident.



**Figure 3:** Dye control of the catheter obtained on POD1. Neither hematoma nor abnormal collection was visible.

recommendations about inherited bleeding diseases [5]. Only few case reports for peripheral blocks [3,6] and a unique study of 46 patients for neuraxial blocks (spinal and epidural) describe the use of regional anesthesia and analgesia in hemophiliacs [7]. Usually, inherited bleeding diseases are considered as contraindication for regional anesthesia, except for IVRA. However, in several countries, hemophiliacs having surgery are largely over substituted, as the efficient and secure level of the abnormal factor for normal hemostasis is between 30 and 50% [8]. In this case, levels of FVIII were always higher than 85% and the risk of traumatic bleeding related to anesthesia should not exceed that of surgery. As hematologists closely monitor FVIII levels and substitution maintained at least for 2 weeks after major surgery, the bleeding risk related to a peripheral vascular puncture associated with a nerve block seemed to be acceptable, when peripheral regional analgesia is considered important, such as in major joint surgery.

The actual incidence of vascular puncture during brachial plexus block is poorly documented. Sada et al. reported only one case of major hematoma in a study performed in 597 non-hemophiliacs [9]. Wiegell et al. reported no vascular puncture in 221 interscalene catheters [10], and Sandhu reported one case of vascular puncture out of 126 infraclavicular blocks under ultrasound guidance [11]. This risk is thus low, probably lower than 1%. Under ultrasound guidance, as the needle tip could be constantly visualized, this risk should to be considered as acceptable. We choose to perform an axillary plexus block, instead of infraclavicular block, because vascular compression, if needed, is easy to do in the axilla. Furthermore, the brachial plexus is very superficial in the axilla and the risk of vascular puncture related to a profound puncture is reduced. The tip of the needle is easily located in the axilla with the needle almost perpendicular to the ultrasonic beam, while in the infraclavicular approach, as the needle is not parallel to the probe, the visibility of the needle tip is less accurate.

We report the uncomplicated placement of an axillary brachial plexus catheter under ultrasound guidance and nerve stimulation in a hemophiliac for continuous regional analgesia for postoperative pain relief and physiotherapy after elbow arthrolysis. When performed by an experienced anesthesiologist assisted by ultrasound guidance, the risk of vascular puncture during an axillary block seems to be low. With the strict safety conditions in this case, (i.e. a team experienced with hemophiliacs, closely monitored substitution, regional analgesia and dual guidance by nerve stimulation and ultrasound guidance) peripheral nerve catheter for analgesia should be considered for very painful joint surgery in hemophiliacs. Moreover, ultrasound gives

the unique opportunity of repeated examinations looking for local complications. This case report demonstrates how a hemophiliac can be provided with an axillary brachial plexus catheter without complications.

## Supports

Support was provided solely from departmental sources.

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