

Spinal Anesthesia. Philadelphia, J. B. Lippincott Company, 1938, p. 305) the nature of the complication seemed sufficiently infrequent to warrant reporting.

Case 1.—A 75 year old man, had had an above-knee amputation five years previous for arteriosclerosis and gangrene. Since then, he had occasional pain in the stump, but this was not constant or severe. On April 28, 1958, he was given a spinal anesthetic for cystoscopy and urethral dilatation with 100 mg. procaine in 2.5 cc. spinal fluid. Within two to three minutes he developed severe spasmodic pain in the amputation stump and this became so excruciating that 50 mg. meperidine intravenously did not completely relieve the pain. The procedure lasted 30 minutes and analgesia was very adequate for this. The spasms of pain continued for approximately 30 hours. Flaxedil, in 8 mg. doses intravenously, helped lessen the spasms.

Case 2.—A 65 year old man, who had had bilateral above-knee amputations for Buerger's disease, was given 100 mg. procaine as a spinal anesthetic for cystoscopy on March 10, 1958. About four minutes later he developed severe muscle spasm in the left stump causing it to stand up perpendicular to the hip, although paralysis was present in the other leg, and at the same time he had spasmodic pain in the end of the left stump. This persisted for 15 minutes until it was relieved with 50 mg. of sodium thiopental and 8 mg. Flaxedil intravenously. The right stump was not affected adversely, and analgesia for the procedure was quite adequate.

Case 3.—An 84 year old man, who three years previously had had an above-knee amputation for arteriosclerosis with vascular insufficiency, was anesthetized on April 28, 1958, for a transurethral resection of the prostate. He was given 150 mg. procaine intrathecally in 2.5 cc. spinal fluid. The level of analgesia was ascertained to be the eighth thoracic segment and was adequate for the procedure. Within three minutes after the drug was injected he developed excruciating pain in the stump end, which was spasmodic in nature, occurring every few minutes and lasting 10-20 seconds. This persisted 12 hours after the anesthetic had worn off.

Case 4.—This man was 72 years old and on October 4, 1957, had a below-knee amputation for arteriosclerosis and gangrene. He developed a wound infection and on November 12 was given a spinal anesthetic, for revision of the stump, of 10 mg. pontocaine in 1.5 cc. spinal fluid and 1.5 cc. of 10 per cent dextrose. About three minutes after the drugs were injected he began to have spasmodic pain in the end of the stump which was progressively more severe until it became excruciating. This persisted throughout the procedure and was not related to stimulation of the stump. As the spinal paralysis wore off in the recovery room, the pain left.

CORRESPONDENCE

Axillary Brachial Plexus Block

To the Editor.—I read with especial interest the report in the March-April 1959 Issue of ANESTHESIOLOGY [page 281] of a new (?) technique for axillary brachial plexus block as performed by Doctor Preston J. Burnham. I have used such a method for the past three years; and as one of the members of the Associated Anesthesiologists of Seattle, who have taught or used this method for several hundred patients, I wish to make the following comments:

(1) Doctor Burnham should be complimented for his accurate observations and study and for promoting a simple, effective technique for brachial plexus block.

(2) Only one landmark is necessary—a readily palpable pulsation of the axillary artery near its highest point in the axilla. Since the nerves supplying the hand, the lower arm, and most of the upper arm form a cuff around the axillary artery at this point, any technique which will deposit anesthetic solution on all sides of the artery will produce complete anesthesia for surgery, including the distal portion of the humerus and the overlying tissues. In other words, this is simply a matter of periarterial infiltration. This has been true of our clinical experience ranging from infants to octogenarians.

(3) Such a technique has seemed to us to be an obvious extension of the technique described by Accardo and Adriani (Southern M. J. 42: 920, 1949). They state, however, that the nerve most frequently missed is the radial nerve. Since the musculocutaneous nerve and then the radial nerve may leave their proximity to the axillary artery while still in the distal third of the axilla, it would seem that injecting higher in the axilla would increase the number of satisfactory blocks. It is of interest to note also that there may be considerable overlapping in the cutaneous distribution of these two nerves at the wrist and near the base of the thumb. To further insure adequate radial nerve anesthesia, anesthetic solution should be deposited under the axillary artery as well. This can be done by moving the cutaneous wheel medially and inserting the needle at an angle of about 30 degrees with the skin until the needle lies below the artery with its point just below and lateral to it. Solution is then injected as the needle is withdrawn. This third injection, I believe, will guarantee fewer failures over a long series of cases.

(4) The small doses mentioned by Doctor Burnham may at times prove inadequate for adults. Our total doses have ranged from 3 cc. in infants to over 50 cc. for large, obese, or muscular adults. It seems to be true that significantly lower volumes of anesthetic solution are required by the axillary approach. However, all too often highly desirable block techniques (especially brachial plexus and spinal) have been abandoned and fallen into local disrepute because the anesthetist has been too puristic in the volumes of anesthetic solution injected. This, of course, must be considered with due regard for age, weight, physical status, and all the other factors which may influence drug reactions and overdosage.

(5) A cutaneous encircling cuff of anesthesia is unnecessary for the use of an upper arm tourniquet. When an adequate block is performed by either the axillary or the supraclavicular approach, such unnecessary injections serve only to increase the drug toxicity and delay the ever-urgent surgeon. It is probable that the intercostobrachial nerve is also blocked, since it runs just medial to the plexus in the axilla.

(6) Since no part of the deep structures of the shoulder girdle is anesthetized, conscious patients are able to move the arm at the shoulder and must be cautioned not to try to move the arm during operation. It is obvious also that axillary brachial plexus block cannot be applied for dislocation of the shoulder joint, as can the supraclavicular.

(7) Although the risk of pneumothorax is not present, we have not promoted axillary block to supplant the supraclavicular approach. However, it seems ideally designed for children, for bilateral brachial plexus block, for patients when the supraclavicular area is contraindicated or otherwise difficult to approach, when pulmonary disease contraindicates the even small risk of pneumothorax, or for use by the occasional anesthetist who may have more to fear from pneumothorax. Dr. George Small refers to a modified technique for axillary brachial plexus block anesthesia in his excellent paper on "Brachial Plexus Block Anesthesia in Children" (J. A. M. A. 147: 1648, 1951), but does not present the details of his technique.

(8) We have used axillary brachial plexus block anesthesia also in conjunction with heavy premedication or light basal narcosis for cardiac catheterizations in 51 children. This seems to have advantages over local infiltration at the site of insertion of the catheter. The pediatricians who do the catheterizations are most enthusiastic.

These remarks are submitted not to detract from the worthwhile observations of Dr. Burnham, but rather to supplement them with our experience and to encourage others to use this most satisfactory type of anesthesia.

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To the Editor.—I am glad that Dr. Eather, too, is investigating the uses of regional block anesthesia at this level [see letter above] and would like to comment upon his remarks in the order that they are written:

(2) The landmark of the brachial artery is extremely important. I reported 10 consecutive successful blocks; 4 later cases were nearly complete failures. At the time of injection I was uncertain as to the exact location of the artery. The systolic blood pressure in each instance was below 90 mm. of mercury due to premedication, I believe, rather than to shock. All of our 38 other cases were successful. In each patient the blood pressure was over 120/60. I feel, therefore, that the systolic pressure should exceed 120 for a successful block. The pectoralis major tendon insertion is an equally important landmark. I inject within 1 to 2 centimeters distal to it. I have performed dissections upon several cadavers which show that