

# Blind Extrathoracic Subclavian Venipuncture for Temporary Pacing Lead Insertion:- A 4 Year Experience in 760 Patients.

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Seven hundred and sixty patients admitted in Cardiology Dept. Mayo Hospital, Lahore from Feb.1994 to Jan 1998 were inserted temporary pacing lead for different indications. Modification of the percutaneous technique for extrathoracic subclavian venipuncture proposed by Magney and colleagues for permanent pacing lead placement was used. Before puncturing bony landmarks were marked on the skin according to Magney's description to identify the needle entry point. Then the venipuncture was accomplished by inserting the needle through a standard infraclavicular land mark. 760 patients were approached with this technique with in a span period of four years. This technique was successful in 684 (90%) cases with first puncture, additional 35 (5%) with second attempt, while additional 14 (2%) patients required multiple attempts or the change of the site. In rest 3% the procedure was completed using other routes. Patients were followed till the removal of temporary pacing wire or implantation with permanent pacing system. In the present study the blind approach to the extrathoracic portion of the subclavian vein proved to be safe and effective for pacing lead insertion. Further observations are required to establish whether this method decreases the complication rate.

**Key Word:-** Temporary Pacing, subclavian vein, extrathoracic subclavian venipuncture.

Temporary pacing lead insertion is a blind procedure carried out in the emergency department where patients are landed due to complete heart block, asystole or bradycardia or due to different other reasons needing urgent placement of temporary pacing lead. Usually it is very important to complete the procedure within a few minutes to save the life of the patient. This can happen only if one has the basic knowledge of the exact location of the subclavian vein and know how to enter in it. Magney JE, in 1993 gave guidelines of this approach in PACE<sup>(1)</sup> Later on many studied this technique using different modalities like Echo, Doppler, Fluoroscopy, use of contrast media etc. further strengthening this technique<sup>(2-6)</sup>. In this study we present our data of 760 patients in whom this technique was used:

## Material and Method

All the patients admitted in Cardiology Dept. or the patients in the emergency department or in other medical wards of Mayo Hospital, Lahore with the need for temporary pacing due to different indications were approached through this route. The puncture was made blindly on bed side or in the cardiac catheterization lab. under strict aseptic conditions. The study duration was from Feb. 1994 to Jan.1998. There were 760 patients. Out of which 430 were males and 330 were females. Age range was from 21 years to 95 years. 410 patients needed temporary pacing due to blocks after myocardial infarction. Rest of the patients have complete heart block, symptomatic A-V blocks, myocarditis or AF with slow ventricular rate. Patients were approached through Rt. sided subclavian vein in 90% of the cases.

### *Extrathoracic subclavian venipuncture technique*

Before putting the needle into the subclavian vein the following technique was used. Bony landmarks were made

on the skin according to the Magney's technique (Fig.1). The needle entry point was identified at the junction of the middle and lateral thirds of a line drawn between the

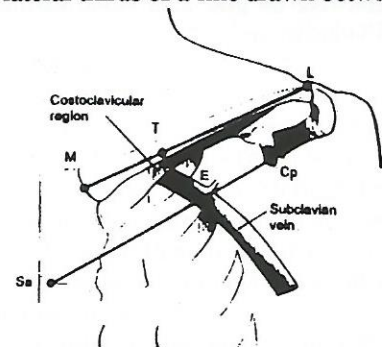


Fig.1. Relationship among extrathoracic subclavian vein, clavicle, first rib and soft tissue of the costoclavicular region.

middle of the sternal angle and the coracoid process of the scapula. A second point (the target point) identifying the ideal location of the subclavian vein as it crosses the first rib, was marked at the junction of the medial and middle thirds of the clavicle. Patient was in supine position or in Trendelenburg position with the head turned on the opposite direction. The extrathoracic Subclavian venipuncture was accomplished carefully by advancing the needle towards the target point (Fig.2). According to Magney's method the operator's thumb was located in over the skin at this point and projected 1 or 2cm below the clavicle such that the needle was directed deep toward the vein and the subclavius muscle was protected from the needle itself. If the subclavian could not enter while advancing the needle or pulling back then the puncture was repeated at the same time. If repeated attempts failed then the opposite Subclavian vein was used. If that failed then



Internal Jugular vein of either side or femoral vein of either side were attempted. Side motion of the tip of the needle was avoided to prevent inadvertent vascular tears. After successful puncture temporary pacing wire was inserted via the canula and lead was positioned either blindly or under fluoroscopic control. In the end the canula was removed out and the lead was tied with the surrounding skin with the help of non absorbable suture material and dressing was done after making a loop of the lead outside.

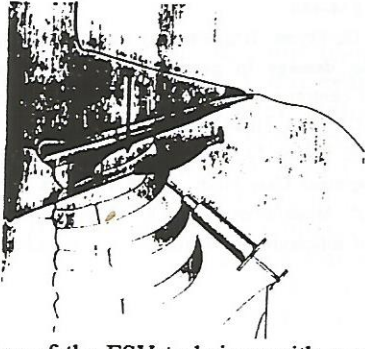


Fig.2. Illustration of the ESV technique with a needle inserted through a classic infraclavicular region.

### Results

A total of 760 patients were attempted using this extrathoracic Subclavian venipuncture technique. The vein was successfully cannulated in 684 (90%) patients in first attempt. Another 35(5%) patients were cannulated in second attempt. Another 13(2%) patients required repeated attempts on the same side for successful puncture. Rest of the 28(3%) patients required approach through the opposite Subclavian vein, or internal Jugular vein of either side or femoral vein of either side or the brachial vein to complete the procedure. In obese patients especially females with heavy pad of fat, patients with large build or anteriorly bowed clavicle, the venipuncture was more difficult requiring more than two attempts. Complications include arterial puncture 9 patients, pneumothorax 5 patients, injury to brachial plexus 2 patients and injury to thoracic duct 1 patient, surgical emphysema 1 patient, Haemothorax 2 patients were the complications requiring transfusion 1 patient. None of these patients were on anticoagulant therapy. These complications are comparable to other center's<sup>7</sup>. Complication rates were less in experienced hand as compared to trainers as specified by the Parsonnet<sup>8</sup>. Patients remained admitted in the department till their rhythm restored to normal or permanent pacemaker was implanted or the patient expired due to primary disease.

*Post insertion complications unrelated to extrathoracic subclavian venipuncture.*

Thirty eight (5%) patients have infection of the lead at the point of entry despite the use of antibiotics. 22(3%) patients have lead displacement requiring repositioning of the lead. In 4 patients temporary lead was fractured at the

point of connection with the pacemaker requiring urgent replacement of the lead. No patient on anticoagulant therapy had hemorrhage.

### Discussion

In our experience of the blind extrathoracic subclavian venipuncture approach using a modification of the anatomic approach, originally designed by Magney and colleagues<sup>1</sup> proved to be a safe and practical technique for permanent pacing lead insertion also proved practical and suitable for temporary pacing lead insertion. It is noteworthy that our experience had very few complications.

The safety of this approach depends on the relationship between the extrathoracic portion of the subclavian vein and the surrounding structures<sup>3,9,10</sup>. At this level the vein crosses the first rib that protects the underlying apex of the lung and is anterior to the subclavian artery and to the brachial plexuses. Moreover the lymphatic duct, the other large blood vessels and the nerves are all medial to the course of the venipuncture. Despite these anatomic advantages Magney and Colleagues<sup>1</sup> reported 3 pneumothorax (0.6%) and 2 (0.4%) arterial punctures in a series of 507 central venous catheters inserted by their technique. This complication rate of 1% was low compared to up to 6.6% using the classic approach<sup>12</sup>.

A careful identification of bony landmarks is essential for effective extrathoracic subclavian venipuncture. In a few obese or large build patients with unfavorable chest wall configurations the approach failed or was difficult. This technique was quite safe even in inexperienced hands. With this technique the lead does not pass through the Subclavius muscle and the ligaments of the costoclavicular region or at least through their densest parts. Different imaging techniques have been proposed to identify the extrathoracic portion of the subclavian vein like Fluoroscopy, Doppler, Echo, etc., has been described as useful tools to successfully enter the vein and minimize the complications<sup>2,3,6</sup>. Moreover some complications associated with the blind approach like pneumothorax or arterial puncture were not eliminated by these methods.

The blind extrathoracic subclavian venipuncture, if carefully performed, is advantageous as it allows a rapid venous access without introducing additional time consuming or potentially contaminating maneuvers. No additional radiation exposure is required. The use of venography or ultrasound imaging may be advisable and very helpful in some cases with particularly unfavorable venous anatomy.

### Conclusion

Blind extrathoracic subclavian venipuncture for temporary pacing lead insertion either in catheterization Laboratory or bed side is safe and time consuming not only in expert hands but also in training doctors provided that proper

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landmarks are chosen.

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