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Original article

## Elbow arthroscopy: An alternative to anteromedial portals



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### ABSTRACT

**Background:** Elbow arthroscopy is considered to be a difficult procedure with a high complication rate. These two disadvantages are due to the proximity of neurovascular structures.

**Hypothesis:** The aim of our study was to evaluate the efficacy and complication rate of a new elbow arthroscopy technique without anteromedial portals. This approach was taken because of the high rate of ulnar nerve damage using the medial portal, and the difficulty of performing triangulation of opposite portals in a patient in the lateral decubitus position.

**Material and methods:** Fifteen patients were operated on by the same surgeon between 2010 and 2012. Range of motion and the “MEPS” elbow score were calculated preoperatively and at the final postoperative follow-up. The average age of patients was 38.3 years. The follow-up was 11.1 months. Personal portals (high anterolateral and intermediate anterolateral portals) were used instead of the anteromedial portals.

**Results:** Elbow flexion increased from 113° preoperatively to 129° at the final follow-up ( $P=0.009$ ). Extension increased from  $-33^\circ$  to  $-10^\circ$  ( $P<0.0001$ ). The preoperative and final postoperative “MEPS” scores were 56.3 and 94 respectively ( $P<0.0001$ ). Two patients (13.3%) had radial nerve palsy with complete recovery 6 and 9 months after surgery.

**Discussion:** The rate of nerve complications following elbow arthroscopy varies from 0 to 14%. The rate in our series (13.3%) is comparable to the results of the literature. This rate should be placed in perspective (since one patient had multiple open surgery elbow operations before arthroscopy). All complications were transient. Improved elbow range of motion in our study is consistent with the results in literature.

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## 1. Introduction

In 1931, Burman concluded that arthroscopy should not be used in the elbow based on a cadaveric study [1]. As progress was made in equipment and surgical techniques improved, the use of arthroscopy of the elbow was reconsidered.

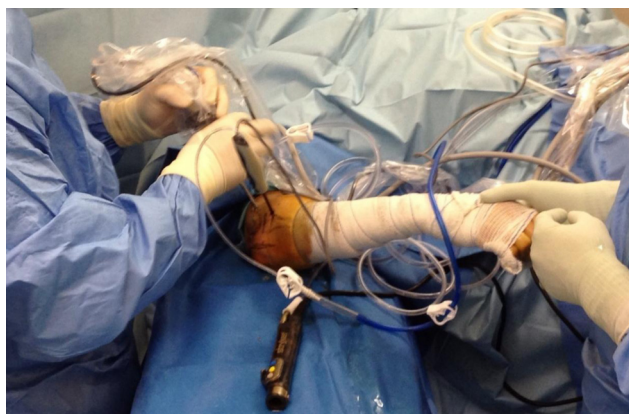
In the first in vivo elbow arthroscopy in 1985, Andrews et al. described anteromedial, anterolateral and posterolateral portals [2–4]. The most frequently used portals are the proximal anterolateral, the standard anterolateral, the proximal anteromedial, the standard anteromedial, the direct lateral portal or “soft spot” portal and the superior posterolateral portal [5,6]. The rate of neurovascular complications is higher in arthroscopies of the elbow than in other joints, because of the proximity of neurovascular structures [7].

The goal of our study was to evaluate the efficacy and rate of complications of a new elbow arthroscopy technique. This technique involves using accessory anterolateral portals as an alternative to anteromedial portals, thus avoiding complications associated with these portals, and to perform elbow arthroscopy despite the presence of instability or ulnar nerve transposition.

## 2. Materials and methods

This was a retrospective study. The medical files and surgical reports of 15 patients who underwent elbow arthroscopy between 2010 and 2012 at hôpital Cochin in Paris and the Arago clinic in Paris were reviewed and the following information was obtained: age, gender, dominant side and operated side, diseases and symptoms, length of follow-up, preoperative and final postoperative range of motion: elbow flexion, extension, pronation and supination, preoperative and final postoperative “Mayo Elbow Performance Score” (MEPS), perioperative and immediate postoperative complications and late complications.

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**Fig. 1.** Patient is in the supine position. The upper limb is on an arm surgery table. The forearm is wrapped in an elastic bandage. The surgeon is next to the patient's head. The assistant is facing him/her. The column is in front of them. The arthroscope and the instruments are inserted by the anterolateral portals.

## 2.1. Patients

The mean age of patients was 38.3 (17–77). There were nine men (60%) and six women (40%). Fourteen patients (93.3%) were right handed. Eight of these 14 patients were operated on the dominant side and six on the non-dominant side. Only one left-handed patient (6.7%) was operated on the dominant side. The mean length of follow-up was 11.1 months. All patients were operated on by the same surgeon using the specific technique described below.

## 2.2. Surgical technique

### 2.2.1. Patient positioning

In most cases this intervention is performed under loco regional anaesthesia (axillary or humeral nerve block), with or without a catheter depending on whether postoperative analgesia was necessary for cases requiring aggressive surgical procedures (arthrolysis...). The patient was installed in the supine position with the upper limb on an arm surgery table (Fig. 1). A tourniquet was placed at the root of the arm. It was inflated to 10 mm Hg above the patient's systolic pressure. Bone landmarks (radial head, epicondyle, olecranon process as well as the portals were drawn in with a dermatographic pencil (see Section 2.2.2). To limit the risk of diffusing saline solution in the forearm during arthroscopy the patient's arm was wrapped in a sterile band from the hand to the proximal forearm leaving the portals accessible. The equipment used was a 4 mm 30 degree offset arthroscope and an electric scalpel. We preferred to use a low-pressure pump. Arthroscopy was preceded by an intra-articular injection of 10–20 mL of saline solution into the "soft spot". To establish the portal, only the skin was cut and subcutaneous tissue splitting with a fine tipped forceps made it possible to enter the distended joint and minimize neurological risks. The surgeon was sitting at the patient's head and the assistant was in front of him/her. The arthroscopy column was installed on the side of the non-operated limb.

### 2.2.2. The portals

Before beginning surgery, the hypothetical and usual course of the radial nerve and especially where it usually crosses the lateral aspect of the humeral diaphysis was drawn in. This reference point was very important to identify our anterolateral portals because we had to keep a safety margin under the trunk of the radial nerve where it runs along the lateral aspect of the inferior third of the humerus. No medial portal was used during the procedure.



**Fig. 2.** Anterolateral portals. 1. Standard anterolateral portal. 2. Middle anterolateral portal. 3. Superior anterolateral portal. 4. Intermediate anterolateral portal. 5. High "sub-radial" anterolateral portal. 6. Radial nerve.

Conventional posterior and anterolateral portals were used as well as the two following personal portals (Fig. 2):

- the high "sub-radial" anterolateral portal was located 2 cm below where the radial nerve crosses the lateral column of the humerus in a plumb line to the lateral epicondyle. Only the skin was cut, then a blunt trocar using the lateral aspect of the diaphysis as a reference, penetrated the distended joint following injection of 10 mL of saline solution through the soft spot. The point of entry was quite distant from the median nerve;
- the intermediate anterolateral portal: it was located between the proximal anterolateral portal (located 2 cm above and 1 cm in front of the lateral epicondyle) and the high "sub-radial" portal. It made it possible to use a surgical spatula and or a surgical elevator to recline the brachialis muscle.

## 2.3. Elbow evaluation score

The "Mayo Elbow Performance Score" (MEPS) (Table 1) was used to evaluate the elbow [8,9]. The total maximum score is 100 points. The higher the score, the better the elbow function. If it is between 90 and 100, the results are considered "excellent"; between 75 and 89, "good"; between 60 and 74 "average" and scores under 60 are considered "poor". This score was considered preoperatively and at the final postoperative follow-up.

**Table 1**  
Mayo Elbow Performance Index.

Function	Points	Definition (Points)
Pain	45	None (45)
		Mild (30)
		Moderate (15)
		Severe (0)
Motion	20	Arc > 100 degrees (20)
		Arc 50–100 degrees (15)
		Arc < 50 degrees (5)
Stability	10	Stable (10)
		Moderate instability (5)
		Gross instability (0)
Function	25	Comb hair (5)
		Eat (5)
		Perform hygiene (5)
		Put on shirt (5)
		Put on shoes (5)
Total	100	

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