

Original article

# The importance of a double team in brachial plexus surgery

## *Intérêt d'une double équipe chirurgicale dans la chirurgie du plexus brachial*

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### Abstract

**Aim.** – Brachial plexus surgery constitutes a long and complex procedure. The aim of our study is to assess the interest of having a double operating team throughout the duration of this surgery.

**Patients and methods.** – Seventeen patients with brachial plexus palsy underwent surgery operated by a double team. The operating time corresponding to each step of the procedure and the total operating time were measured for each patient. The separate values were added so as to obtain a simulation of the total duration value for a single surgeon. The operative time of this virtual group of patients (Group I) was compared to that of the real group operated by the double team (Group II). Both values were compared to assess any statistical significance.

**Results.** – The mean operating time was 259 min with surgery operated by a double team and 371 min in the group I, a difference found to be statistically significant ( $p < 0.05$ ). Exploration and preparation of the cervical region lasted 70 min in average with the double team versus 132 min in the group I ( $p < 0.05$ ). No perioperative complications were noted.

**Discussion and conclusion.** – Brachial plexus surgery performed by a double team allows the reduction of the operating time and thus minimizes the drawbacks associated with lengthy surgery such as perioperative bleeding and infection. Microsurgical suturing which is the crucial part of the surgery is easier when performed at the end of a shortened intervention and shared by two senior surgeons with, subsequently, less fatigue. This new organization that improves the operating conditions guarantees best results.

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**Keywords:** Brachial plexus; Operative duration; Double team; Microsurgery

### Résumé

**Objectifs.** – La chirurgie du plexus brachial est complexe et longue. L'objectif de notre étude est de montrer l'intérêt d'utiliser une double équipe de chirurgiens seniors afin de diminuer la durée de l'intervention.

**Patients et méthodes.** – Dix-sept patients présentant une paralysie totale du plexus brachial étaient opérés en double équipe. La durée de chaque temps opératoire ainsi que la durée totale ont été mesurés pour chaque patient. Ces valeurs ont ensuite été additionnées afin de simuler une intervention conduite par un seul chirurgien, puis comparées à la durée de l'intervention réalisée en double équipe.

**Résultats.** – Les durées opératoires moyennes étaient de 259 minutes en double équipe et 371 minutes avec un seul chirurgien. Cette différence était statistiquement significative ( $p < 0,05$ ). Les durées moyennes d'exploration et de préparation de la région cervicale étaient de 70 minutes en double équipe et de 132 minutes avec un seul chirurgien senior. Cette différence aussi était significative ( $p < 0,05$ ). Aucune complication n'était notée.

**Discussion et conclusion.** – La chirurgie du plexus brachial en double équipe permet de diminuer de façon significative la durée de l'intervention. Elle diminue donc les complications reconnues comme liées à la durée de l'intervention, notamment l'infection et le saignement peropératoire. De plus, le temps microchirurgical fondamental, réalisé à la fin d'une intervention plus courte, peut être partagé par les deux chirurgiens seniors. Cette organisation en double équipe permet d'améliorer les conditions de l'intervention, garantissant en conséquence de meilleurs résultats.

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**Mots clés :** Plexus brachial ; Durée opératoire ; Double équipe ; Microchirurgie

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## 1. Introduction

Brachial plexus surgery constitutes a long and complex procedure. Certain steps necessitate enhanced meticulous attention and justify the operative assistance of trained personnel. The microsurgery phase requires most concentration and its adequate achievement can be jeopardized by potential exhaustion of the surgeon. Moreover, it may require a change in the operative strategy depending on the lesions encountered.

The aim of our study was to assess the importance of having a double team operating, headed by two senior surgeons, throughout the surgery for brachial plexus. This has been done and evaluated in terms of duration of the operative time.

## 2. Patients and methods

Our series consisted of 17 male patients with complete traumatic brachial plexus palsy. The dominant side was affected in 10 cases. The interval between the accident and the intervention ranged from 2 to 10 months.

The operations were systematically performed with two teams operating, each headed by one senior surgeon trained and specialized in brachial plexus surgery (*JNG* and *FT*) [1–3]. One team worked on the cervical region, the other on the brachial region. One team harvested the vascularized ulnar nerve and the sural nerves if necessary, depending on the progress of the other team. Team roles were regularly reversed. Both teams worked on the same operative field during harvesting of the intercostals nerves. Nerve sutures were always performed with a microscope.

In order to simplify the analysis of the different operative durations, minimum, maximum and average times were analyzed for each region dissected. These durations included dissection, identification of the target structures and macroscopic preparation. A separate time value was noted for the microsurgery phase, including nerve trimming, microsutures and the application of tissue glue. A final value was noted for skin suturing.

For the sake of the comparison, two groups, group I and group II, were artificially created, with the same patients. Group I was a “virtual group” as one virtual surgeon performed all the surgical steps. For this group, the total operative time was simply the sum of the aforementioned values. Group II was the “real group”, that really operated by the two senior surgeons; in this group, the values of duration of simultaneous steps were

merged (i.e., the longer operative time was selected) and then added.

The Student “*t* test” was used to compare the two groups. All tests were performed using statistical software (Statistica<sup>®</sup>, Statsoft Inc, Maison-Alfort, France).

## 3. Results

Results are displayed in Table 1. The mean time of intervention was 259 min with group II and 371 min with group I. This difference was significant ( $p < 0.05$ ). Mean time of exploration and preparation of cervical and brachial regions was 70 min with the group II versus 132 min with group I. This difference was also significant ( $p < 0.05$ ). No significant differences were found regarding the side of the lesion. No perioperative complication was noted. None of the patients required blood transfusion and there was no postoperative infection.

## 4. Discussion

Brachial plexus surgery is complex and necessitates the approach and dissection of multiple operative fields [4]. Performing this surgery using two groups allows simultaneous approach of these fields. Each team must be trained for brachial plexus surgery and must include a senior surgeon specialized in nerve microsurgical reconstruction. Although some publications have presented toe transfer series operated by a double team [5], no publications have studied specifically the contribution of two surgical teams.

The analysis of our results show that the duration of surgery in the group II was significantly reduced compared with that noted with the group I. We did not take into account skin closure with the group II since this could be accomplished by one team while the other was performing the microsurgery.

Simultaneous preparation of the different operative fields reduces the operative time by about 50%. The risk of infection is therefore diminished [6–8]. Nerve microsurgery is the last phase of the procedure and the most critical one, since it is on this phase that the entire surgical outcomes depend. The operator’s fatigue generated by this lengthy surgery is diminished when the total duration is decreased [9–11]. Moreover, each senior surgeon participates in the microsurgery so as the microscope work load of each is decreased. In the future, robot surgery should improve double team surgery since

Table 1

Comparison of mean operative durations (in minutes) between the double team (Group II) and the single team (Group I).

	Double team (Group II)	Single team (Group I)	
Cervicobrachial exploration	70	132	$p < 0.05$
Intercostal nerves dissection	59	59	NS
Ulnar/sural nerve dissection	43	43	NS
XI-SS suture	28	37	NS
Intercostal nerves suture	37	58	$p < 0.05$
Nerve graft sutures	46	61	$p < 0.05$
Total operative time	259	371	$p < 0.05$

this technique is likely to reduce the fatigue related to microsurgery by facilitating micromovements [12,13].

The only procedure phase during which both surgeons work directly together is the intercostal nerves harvesting. This sampling is complex due to the size of the intercostal nerves (thinner than digital nerves) which necessitates extreme caution in handling (silicon) and traction. Moreover, the contra-indication related to haemostatic tools (used to prevent nerve coagulation) necessitates constant delicate dabbing by the assistant. The placement of intercostal retractors under the ribs requires also great caution so as to prevent breaching the pleura. In addition, this phase of surgery involves rasping the ribs and moving the thorax as well as the patient thus hindering any fine dissection at another site.

Finally, brachial plexus surgery is complicated and some decisions have to be taken during the intervention. In such case, the indications can be discussed between the two senior surgeons.

However, our study presents some limits. The use of a virtual group is statistically less powerful than the comparison of two real groups of patients and data have been analyzed retrospectively. Consequently, it would be interesting to conduct a cadaveric study aimed at comparing the results of a real single team and those of a double team.

#### Conflicts of interest statement

None.

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