

TOURNIQUET VERSUS NO TOURNIQUET USE IN KNEE VIDEOARTHROSCOPY: A MULTICENTRIC, PROSPECTIVE, DOUBLE-BLIND, RANDOMIZED CLINICAL TRIAL

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ABSTRACT

Objective: To evaluate whether, by using an arthro-pump (irrigation equipment with pressure sensor), pneumatic tourniquet use could interfere with the duration of surgery, recovery of movement and joint volume in patients who underwent knee videoarthroscopy for partial meniscectomy. **Methods:** 103 patients divided randomly into two groups regarding use or nonuse of a pneumatic

tourniquet were evaluated in five different centers by seven different surgeons. The variables were evaluated during the surgery and seven days after the operation. **Results:** No statistically significant differences were found among any of the variables studied. **Conclusion:** There are no reasons that would either justify or discredit tourniquet use in this specific situation.

Keywords – Surgery; Arthroscopy; Tourniquets

INTRODUCTION

Bloodless surgical fields greatly facilitate surgical procedures, particularly in orthopedics. For videoarthroscopy, such fields are more easily achieved through the use of pneumatic tourniquets, which subject the limb root to pressures that are two to three times higher than the systolic pressure, thereby making it easier to view and carry out the procedure, either through the absence of bleeding or through greatly diminished bleeding^(1,2).

Despite the large benefits, the use of tourniquets is not free from risks, since the compression cause tis-

sue trauma. A variety of complications from their prolonged use (particularly beyond two hours) have been described⁽³⁾.

Even with rapid use, the muscle compression may be sufficiently significant to delay the postoperative recovery, which may be painful because the patient will have to recover from two aggressive actions: not only the surgical procedure itself but also the use of the tourniquet⁽⁴⁾.

Since the initial studies by Watanabe in the 1960s, arthroscopy has evolved fast, both as a diagnostic and as a therapeutic method. Its use has expanded to a wide

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Declaramos inexistência de conflito de interesses neste artigo

variety of joints, and the use of microcameras, along with video, has enabled major improvements in the images obtained⁽¹⁾.

For better viewing during videoarthroscopy, the use of “arthropumps” (irrigation equipment provided with a pressure sensor) was developed and popularized beginning in the early 1990s. In addition to controlling pressure, these devices control the flow of fluids entering and leaving the joint⁽³⁾.

Arthroscopic meniscectomy is traditionally considered to be a low-morbidity procedure, with rapid postoperative recovery. The literature on tourniquet use in this procedure is sparse and the clinical relevance of its use remains undefined, as does its postoperative influence^(4,5).

The aim of the present study was to evaluate whether, by using irrigation equipment with a pressure sensor, pneumatic tourniquet use could influence the duration of the surgical procedure, recovery of movement and the joint volume in patients who underwent knee videoarthroscopy for partial meniscectomy.

MATERIAL AND METHODS

A total of 103 patients who underwent knee videoarthroscopy performed by seven different surgeons in five different centers between January 2006 and December 2007 were evaluated. These patients were divided into two groups by means of a draw:

Group 1 (n = 51): patients who were fitted with a pneumatic tourniquet around the root of the thigh on the operated leg that was not inflated.

Group 2 (n = 52): patients who were fitted with a pneumatic tourniquet around the root of the thigh on the operated leg that was inflated to a pressure of 350 mmHg.

Only patients with isolated lesions of the medial meniscus (either degenerative or traumatic) for which partial meniscectomy was performed were included. The exclusion criteria were the presence of other meniscal or ligament lesions in the same knee or in the contralateral knee, inflammatory diseases or chondral lesions for which any intervention other than simple regularization was necessary.

All the patients underwent the operation in the supine position, after administration of epidural or spinal anesthetic block.

For performing the videoarthroscopy, “arthropumps” of differing manufacture and model were used in both

groups. These were regulated such that a constant intra-articular pressure of 55 mmHg and flow of 1.5 liters/minute would be maintained.

All the data relating to the patient and the surgery were gathered at the time of the surgical procedure.

All of the patients were evaluated on the seventh postoperative day, with measurement of the joint perimeter at a distance of 5 cm from the upper pole of the patella, and measurement of the range of motion of each knee. In this evaluation, neither the patient nor the examiner knew which group the patient was in.

The results were analyzed using the Epi-Info software, version 6.0, and the Student t analysis method was used to compare paired samples. The Mann-Whitney, Wilcoxon and Kruskal-Wallis tests were also used.

This study was approved by the Research Ethics Committee of Mother Teresa Hospital, and this approval was subsequently ratified by the corresponding committees in the other institutions. Written consent was obtained from all the patients.

RESULTS

This study evaluated 103 patients, of whom 41 were women and 62 were men. The patients' mean age was 49.22 years, with a range from 15 to 81 years. The mean age in group 1 was 49.17 years (range: 15 to 80 years). In group 2, the mean age was 49.26 years (range: 20 to 81 years). No statistical difference in ages was observed between the two groups (t test with $p = 0.9766$; and Kruskal-Wallis test with $p = 0.9055$).

In relation to the duration of the surgery in the two groups, the mean time taken in group 1 was 21.29 minutes, with a range from eight to 60 minutes. In group 2, the mean time taken was 21.71 minutes, with a range from eight to 45 minutes. No statistically significant difference was observed between the two groups (Student t test with $p = 0.8528$; and Kruskal-Wallis test with $p = 0.5743$).

On the seventh postoperative day, the difference in range of motion between the operated and non-operated side in group 1 was a mean of 8.36 degrees, with a range from 0 to 50°. In group 2, the mean was 8.70 degrees, with a range from 0 to 50°. Comparison between these two groups using the Student t test showed $p = 0.8829$. For the same variables, the Kruskal-Wallis test showed $p = 0.3966$.

In relation to the joint perimeter on the seventh postoperative day in group 1, it was observed that the mean

increase in volume on the operated side was 0.2686 cm, with a range from -2.5 to 3 cm. In group 2, the mean increase in volume was 0.2788 cm, with a range from -2 to 4 cm. Comparison between these two groups using the Student t test showed $p = 0.9669$. For the same variables, the Kruskal-Wallis test showed $p = 0.9813$.

The results found are summarized in Table 1.

Table 1 – Comparison between groups 1 and 2 and the respective p values.

	Group 1 (without tourniquet)	Group 2 (with tourniquet)	p value
Age in years	49.1765	49.26	0.9766
Duration of surgery in minutes	21.2941	21.7115	0.8528
Difference in range of motion between the knees in degrees	8.70	8.36	0.8829
Difference in perimeter between the knees in cm	0.2686	0.2788	0.9669

Source: Medical Archive Services of the institutions.

DISCUSSION

Despite the initial impression of better viewing with the use of the tourniquet, which had already been reported by Kirkley et al (6), this was not shown to be of relevance for the procedure, since the duration of the surgery was shorter in the group in which the tourniquet was not used.

The tourniquet around the limb root was not inflated for any patient in group 2, even if the surgeon initially had some difficulty in viewing the lesion site. Placing the tourniquet on these patients was a requirement of the Ethics Committee, under the allegation of safety for patients: in the event of difficulty that might make it impossible to proceed with the surgery, it would be possible to finish the procedure under limb compression,

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which would thus exclude the patient from the study.

The findings and the pressure used by Kirkley et al(6) were partially concordant with those in the present study. Despite using a pressure of 300 mmHg, they did not find any difference between their two groups (formed through random allocation) with regard to a variety of matters, including range of motion, which was also similar in the two groups. Although the surgeons involved in their study estimated that their ability to view the site without using the tourniquet was three times worse than with its use, the mean duration of the operation was similar between the groups (31.1 and 30.5 minutes, respectively), thus resembling the findings of the present study.

The shorter mean duration of the surgery in both groups of the present study, in relation to what was reported by Kirkley et al(6), may be explained by the standardization of the intra-articular lesions that was ensured in the present study but not mentioned in Kirkley's study.

In the present authors' opinion, the used of irrigation equipment with a pressure sensor was fundamental for carrying out the procedure with a bloodless field and without inflating the tourniquet. This care makes it impossible to compare the results described here with the findings of Olszewski et al(7), who used gravitational flow and epinephrine solution to avoid tourniquet use.

Despite the general harm that compression may cause to the thigh muscles, joint distension alone may also be harmful, even in patients for whom the tourniquet was not inflated. This event was observed and reported by Thorblad et al(4), and Johnson(8) subsequently commented on this in relation to quadriceps torque.

CONCLUSION

In knee videoarthroscopy to treat medial meniscal lesions, there are no reasons that would either justify or discredit tourniquet use provided that irrigation equipment with a pressure sensor is used.

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