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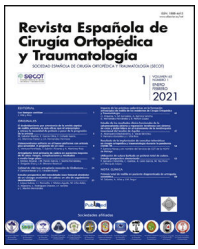

ORIGINAL PAPER

[Translated article] Preoperative instillation of epinephrine and lidocaine can reduce surgical time in the endoscopic treatment of GTPS

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KEYWORDS
Greater trochanteric pain syndrome;
Surgical time;
Intraoperative blood loss;
Lateral hip pain

Abstract
Introduction: Greater trochanteric pain syndrome (GTPS) is a multifactorial clinical condition affecting the lateral area of the hip. Although conservative treatment shows good results, some patients may still require surgical bursectomy, which can be performed either openly or endoscopically. One of the main technical difficulties of the endoscopic procedure is intraoperative bleeding, which can hinder the medical team's vision and increase the operation time for endoscopic treatment of GTPS. *Hypothesis*: An instillation of vasoconstrictors and local anaesthetics before endoscopy will cause less intraoperative bleeding, which will translate into shorter surgical time.
Materials and methods: A prospective cohort was retrospectively divided based on the use or absence of a preoperative instillation of physiological saline solution with epinephrine and lidocaine. Surgical time was measured in each procedure and compared between the two groups.
Results: One hundred thirty-nine hips from 139 patients were included in the analysis. One hundred two patients were included in the instillation group versus 37 in the control group. The surgical time was significantly shorter in the instillation group than in the control group, with an average (standard deviation) of 52.01 (14.71) and 72.30 (11.70) min, respectively ($p < .001$).
Conclusion: The instillation of a physiological saline solution with epinephrine and lidocaine prior to the surgical treatment of GTPS is effective in reducing surgical times, likely due to a reduction in intraoperative bleeding. Future research should focus on more direct outcomes such as intraoperative blood loss and between different instillation protocols.

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PALABRAS CLAVE
Síndrome doloroso del trocánter mayor;
Tiempo quirúrgico;
Pérdida de sangre intraoperatoria;
Dolor lateral de cadera

La instilación preoperatoria de epinefrina y lidocaína puede reducir el tiempo quirúrgico del tratamiento endoscópico del SDTM

Resumen
Introducción: El síndrome doloroso del trocánter mayor –SDTM– (*Greater Trochanteric Pain Syndrome*) es una condición clínica multifactorial que afecta a la zona lateral de la cadera. Aunque el tratamiento conservador muestra buenos resultados, algunos de los pacientes pueden seguir requiriendo una bursectomía quirúrgica, que puede realizarse abierta o endoscópicamente. Una de las principales dificultades técnicas del procedimiento endoscópico es el sangrado intraoperatorio, que puede dificultar la visión del equipo médico y aumentar el tiempo de operación del tratamiento endoscópico del SDTM. *Hipótesis:* una instilación de vasoconstrictores y anestésicos locales antes de la endoscopia provocará un menor sangrado intraoperatorio, lo que se traducirá en un tiempo quirúrgico menor.
Materiales y métodos: Se dividió retrospectivamente una cohorte prospectiva según el uso o ausencia de una instilación preoperatoria de solución salina fisiológica con epinefrina y lidocaína. El tiempo quirúrgico fue medido en cada procedimiento y comparado entre ambos grupos.
Resultados: Ciento treinta y nueve caderas de 139 pacientes se incluyeron en el análisis. Ciento dos pacientes fueron incluidos en el grupo de instilación versus 37 del grupo de control. El tiempo quirúrgico fue significativamente menor en el grupo de instilación que en el grupo de control, con un valor medio (desviación típica) de 52,01 min (14,71) y 72,30 min (11,70), respectivamente ($p < 0,001$).
Conclusión: La instilación de una solución salina fisiológica con epinefrina y lidocaína anterior al tratamiento quirúrgico del SDTM es efectivo en la reducción de tiempos quirúrgicos. Futuras investigaciones deberían centrarse en resultados más directos como la pérdida de sangre intraoperatoria y entre diferentes protocolos de instilación.

Introduction

Greater trochanteric pain syndrome (GTPS) is defined as a chronic pain condition affecting the lateral hip.[1–3] It is a common clinical condition, with a prevalence of 24% and 9% in women and men, respectively.[3]

GTPS is often related to repetitive microtrauma caused by excessive friction between the greater trochanter and the iliotibial band.[4] Such friction was thought to cause bursal inflammation. However, inflammation of the bursal structures has been observed in only a few cases of GTPS,[5] so a more multifactorial aetiology has been accepted, involving gluteus medius tendinopathy and muscle injuries.[6,7]

This syndrome is often considered a diagnosis of exclusion, because its symptoms may overlap with other conditions, such as lumbosacral involvement and interactions at the pelvis and hip level.[6] GTPS includes a spectrum of disorders, such as trochanteric bursitis, gluteus medius and minimus tendinopathies, and external snapping hip syndrome.[8] The prevalence of this syndrome is high in patients with coexisting low back pain, osteoarthritis, and obesity, suggesting a complex interaction between the lumbar region and the hip in the development of the condition.[9]

The first stage of treatment for GTPS is based on rehabilitation, modification of postural habits, weight loss, and muscle strengthening.[10] Pharmacological treatment with analgesics and oral anti-inflammatories has shown good results in 90% of cases.[11] However, in refractory patients, a surgical approach, either open or endoscopic, would be required.[11–14]

One of the main technical difficulties of endoscopic hip surgery is intraoperative bleeding, which can obstruct an accurate view of the surgical site, resulting in longer surgical times. Preoperative instillation of vasoconstrictors and local anaesthetics has been used to prevent these difficulties in other fields of surgery.[12,15–17] The aim of the study was therefore to describe the effects of instillation of physiological saline solution with epinephrine and lidocaine on the surgical time of endoscopic treatment of GTPS. We hypothesized that such instillation would decrease the bleeding observable in the surgical image, improving visualization of the surgical site and shortening surgical times.

Material and methods

Design

We present a retrospective analysis comparing surgical times of endoscopic procedures with and without preoperative instillation of physiological saline solution with epinephrine and lidocaine.

Participants

Between March 2014 and January 2020, all patients operated on for lateral hip pain resulting from GTPS and refractory to

conservative treatment were included in the analysis. All patients had previously undergone physiotherapy sessions, anti-inflammatory therapies, focal shock wave sessions, and/or the application of ultrasound-guided local corticosteroid infiltrations. Patients with total or partial tears of the gluteus medius were excluded.

Patients were retrospectively divided into 2 groups, depending on whether or not a preoperative instillation of physiological saline solution with epinephrine and lidocaine was applied. The preoperative instillation technique was introduced into our hospital's routine clinical practice in 2014. After the protocol change and in keeping with it, all patients operated on from 2014 onwards received instillation. Those who underwent surgery at earlier dates were not subjected to the new protocol and therefore did not receive it. Thus, the 2 study groups were formed.

Surgical technique

All operations were performed by the same surgical and anaesthetic team. The patient was placed in a lateral decubitus position and stabilized using a hip positioning system. The greater trochanter was then palpated and marked, and aseptic procedures were performed on the skin area where the surgery was to be performed. In the infiltration group, a solution of 100 ml of saline solution with 1 ml of epinephrine and 5 ml of lidocaine was injected subcutaneously using a 22G spinal needle. The solution was instilled in a fan pattern through the subcutaneous space, without exceeding the area of the fascia lata or muscle and covering the involved area between 2 cm proximal, 2 cm anterior, 2 cm posterior and 4 cm distal from the greater trochanter (Fig. 1). The aim of the procedure was to reduce intraoperative bleeding and to apply local anaesthesia. The control group did not receive the preoperative instillation procedure.

After preparing the sterile field, 2 portals of less than 1 cm each were created by progressive dilators. The portals were placed one at 2 cm above and approximately 4 cm below the greater trochanter in the midline, parallel to the fibres of the iliotibial tract. Both portals were used for visualization with a 4 mm, 70° lens, as well as for working (Fig. 2).

In order to carry out an outside-in approach to the peritrochanteric space, a subcutaneous space was created by

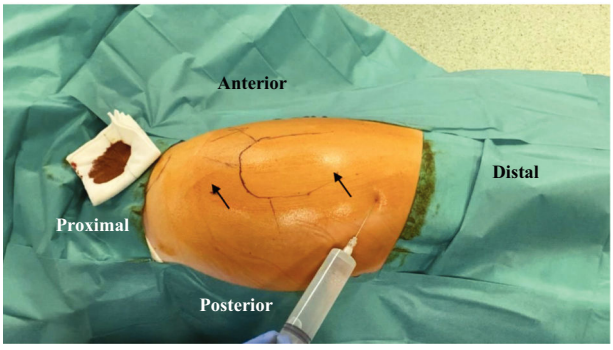

Figure 1 Preoperative instillation of local anaesthetic and vasoconstrictor with a spinal needle in a left hip. The arrows indicate the position of the endoscopic portals.

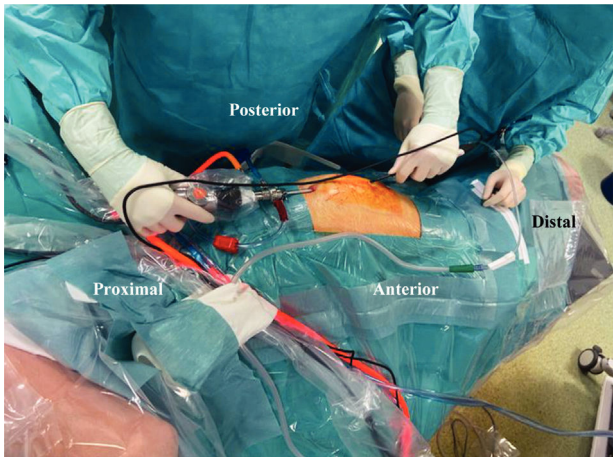

Figure 2 Endoscopic portals in a left hip.

resecting the subcutaneous adipose tissue attached to the fascia lata. Once the fascia lata was sufficiently accessible, a cross-shaped incision was made, allowing visualization of the gluteus medius, greater trochanter, and vastus lateralis. After fasciotomy, the trochanteric bursa was removed and release of the trochanter was confirmed. The skin was then closed using nylon monofilament and a compression bandage was applied.

Variables

For the present study, the following independent variables were taken into account: age, sex, body mass index (BMI), laterality and group. The dependent variable was surgical time, defined as the time between the creation of the portal and its closure by suturing.

Statistical analysis

Data processing was carried out using SPSS® Statistics 15.0 software (SPSS Inc. Published in 2006. SPSS® for Windows, version 15.0. Chicago, SPSS Inc.). Independent tests were used to evaluate the differences in quantitative variables between groups. An alpha error of .05 was accepted with a confidence interval of 95%. Surgical time was correlated with quantitative variables using Pearson correlation coefficients. All analyses were two-tailed.

Results

A total of 139 hips from 139 patients were included in the retrospective analysis, comprising 70 left hips and 69 right hips. Of these, 37 hips operated on in the 2 years prior to the protocol change (2013–2014, without instillation protocol) were included in the control group and 102 in the instillation group. Patient characteristics are contained in Table 1.

No significant differences were found regarding age, BMI, sex, or hip side between the control and instillation groups ($p > .05$). The surgical time was significantly shorter in the instillation group than in the control group ($p < .001$), with mean values (standard deviation) of 52.01 min (14.71) and 72.30 min (11.70), respectively (Fig. 3). A slight correlation

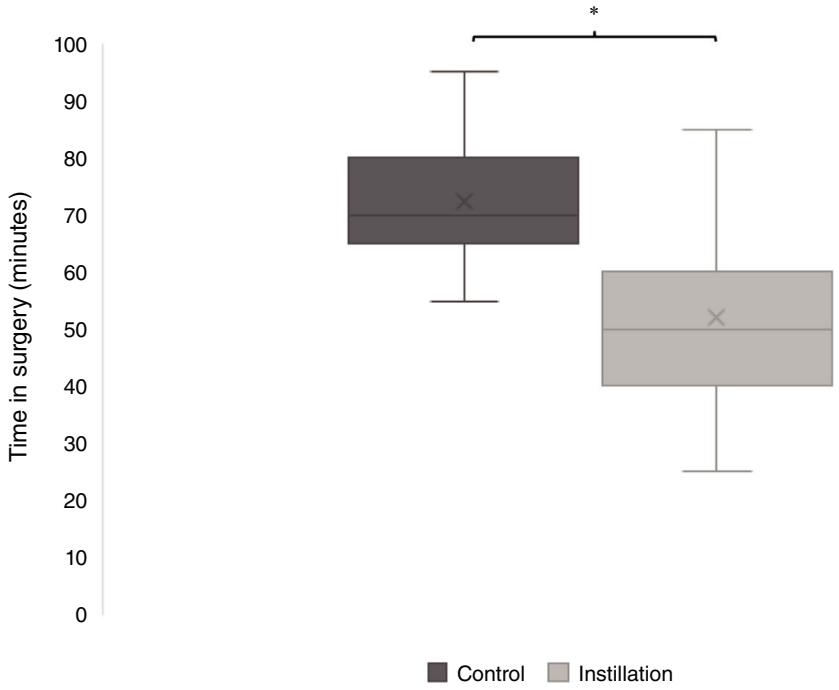

Figure 3 Comparison of surgical times between the instillation and control groups. * Significant difference $p < .05$.

Table 1 Sample characteristics.

	Control group ($n = 37$)	Instillation group ($n = 102$)	p value
Age	52.37 (13.46)	51,51 (14.26)	.749
BMI	25.64 (4.09)	24.82 (4.73)	.351
Sex (masculine %)	32.4%	26.5%	.489
Side (right %)	48.6%	50.0%	.888

was observed between BMI and surgical time (ICC = .169) ($p = .047$). No correlation was observed between age and surgical time. No differences in surgical time were observed between male and female patients ($p = .526$).

Discussion

Performing an instillation before or after an endoscopic bursectomy has already been described previously in the literature. Bradley and Dillingham already included in their original technique an instillation of 25 ml of physiological saline solution with .5% bupivacaine and 1:200,000 epinephrine.[15] Fox et al. infiltrated a 60 ml physiological saline solution with 1% lidocaine and .25% bupivacaine in a deep plane, close to the cortical bone.[16] Baker et al. infiltrated a smaller volume, 30 ml of physiological saline solution without anaesthetics or vasoconstrictors in the bursa before the intervention, but injected a long-acting local anaesthetic at the end of the surgery.[12]

Despite having been mentioned as part of the surgical procedure, the main objective of the instillation is not explained in these articles. In this study, we present an instillation protocol focused on reducing intraoperative bleeding, which is indirectly related to a reduction in surgical time.

The protocol used for this study differs from the others previously described in the literature. In this case, we propose instilling a much larger volume, up to 100 ml of physiological saline solution with 1 ml of adrenaline and 5 ml of lidocaine. The addition of vasoconstrictors such as adrenaline or epinephrine prevents an increase in intraoperative bleeding, while the use of local anaesthetics such as lidocaine aims to reduce postoperative pain. Our protocol also differs from previous studies regarding the instillation site. In our case, instillation was performed in the subcutaneous plane, covering the maximum possible surface area, similar to a lipofilling procedure in plastic surgery.[18] The variations of the preoperative endoscopic instillation procedure are summarized in Table 2.

In this retrospective analysis, operative time was significantly reduced after implementation of the instillation protocol. These results suggest that the use of vasoconstrictors and local anaesthetics prior to endoscopic treatment of GTPS may improve operative time by reducing intraoperative bleeding. However, further studies are required to evaluate the effects of this preoperative instillation protocol on subjective outcomes such as pain or function.

Compared to the previously reported studies, this study focuses specifically on the impact of preoperative instillation on operative time, whereas the other studies focused more on postoperative outcomes and the overall effectiveness of arthroscopic bursectomy, without explicitly mentioning the role of instillation. This difference in approach provides additional insight into how to optimize surgical treatment of GTPS using our instillation protocol,

Table 2 Summary of the variations of the preoperative endoscopic instillation procedure.

Author	Year	Position	Anaesthesia	Instillation solution	Instillation site	Drainage
Bradley et al.	1998	Lateral	General	Pre: 25 ml of SF; .5% of bupivacaine; 1:200,000 epinephrine;	Deep	Jackson Pratt
Fox et al.	2002	Lateral	Local	Pre: 60 ml SS, 1% lidocaine, .25% bupivacaine Post: SS + 80 mg of methylprednisolone + 20 ml .25% bupivacaine	Deep wheel, closet to bone cortex	Not specified
Baker et al.	2007	Lateral		Pre: 30 ml of SS Post: long-acting local anaesthesia	Deep: bursa	No
Mitchell et al.	2016	Traction table	Epidural			Not specified
Current study	2021	Lateral	Epidural	Pre: 100 ml of SS + 1 ml de adrenaline + 5 ml of lidocaine	*Lipofilling*	A round type drain

SS: saline solution.

but is not intended to evaluate the effectiveness of the endoscopic technique.

The results of this study show a significant reduction in surgical time of endoscopic treatment of GTPS after preoperative instillation of physiological saline solution with epinephrine and lidocaine.

Strengths and limitations

This study is not without limitations. Firstly, the reduction in overall surgical time could have been influenced by the surgeon's learning curve. However, the surgical team had more than 10 years of experience in hip endoscopies and arthroscopies prior to the inclusion of the first patient in this study, sufficient time, as previously assessed,[19,20] to prevent the learning curve from having a significant effect. Secondly, this study establishes an indirect relationship between surgical time, intraoperative bleeding and the preoperative instillation protocol. Future research should include direct variables in the study protocol that assess the volume of intraoperative bleeding, haemoglobin or haematocrit levels. One of the strengths of this study is that all surgeries were performed by the same medical team and using the same endoscopic technique, thus avoiding differences in the operating protocol affecting surgical time.

Finally, the fact that patients with gluteus medius tear were excluded may have influenced the results.

Conclusion

This study describes the differences in surgical time in 139 patients operated on by endoscopic bursectomy with and without preoperative instillation of local anaesthetic and vasoconstrictor. The results show a significant reduction in surgical time, suggesting that this new procedure could facilitate surgical management by decreasing intraoperative bleeding, indirectly affecting surgical time. The effect of different instillation protocols on surgical time should be explored, as well as directly evaluating intraoperative blood loss and subjective results of pain and function.

Level of evidence

Level of evidence III.

Informed consent

Informed consent was obtained from all subjects enrolled in this study. Patients also signed an informed consent regarding the publication of their data related to this study.

Ethical approval declaration

All procedures performed in this study involving human participants were approved by the ethics committee of Hospital Quironsalud Barcelona, in accordance with the 1964 Helsinki Declaration and its subsequent amendments (Fortaleza, Brazil 2013).

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Conflict of interests

The authors have no conflicts of interest to declare that are relevant to the content of this article.

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