



Psychological Implications in Percutaneous *Hallux Valgus* Surgery

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Abstract

Background. Despite the evolution of the surgical technique, sometimes patients complain of dissatisfaction even though the objective post-operative parameters do not demonstrate obvious complications.

The aim of the study — to evaluate psychological implications for post-operative pain perception after *hallux valgus* surgery in patients who had already undergone contralateral foot surgery.

Methods. The study included 42 patients treated with percutaneous surgery for bilateral *hallux valgus* in two different time periods (40 females and 2 males; mean-age at the 1st surgery — 55.7 years; mean-age at the 2nd surgery — 56.7 years). All patients were administered a visual analog scale (VAS) one week after surgery to judge post-operative pain. Each of them was evaluated clinically to assess post-operative convalescence. The patients were randomly divided into 2 groups: in group A, patients have not received further indications about post-operative pain in contralateral surgery; in group B, patients have been informed that post-operative pain would have been worse in contralateral surgery. Both groups received the same anesthesiological and pharmacological support in the peri-operative period.

Results. The VAS pain score was 1.03 and 1.55 after first surgery; 4.57 and 0.5 after second surgery for group A and group B, respectively. All patients reported no pain 7 days after surgery. No significant clinical variation was reported.

Conclusion. We observed the great importance of psychological implications for pain perception in patients undergoing foot surgery. The role of a surgeon is related not only to technical skills, but it is also conditioned by their ability to drive patients' individual perception of post-operative outcome.

Keywords: valgus deformity of the first toe; *hallux valgus*; minimally invasive surgery; pain; VAS; patient satisfaction.

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Психологические последствия чрескожной хирургической коррекции *hallux valgus*

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Реферат

Актуальность. Несмотря на развитие хирургической техники, иногда пациенты жалуются на неудовлетворенность своим физическим состоянием, даже если объективные послеоперационные показатели не свидетельствуют о явных осложнениях.

Цель исследования — оценить психологические аспекты восприятия боли после хирургической коррекции вальгусной деформации первого пальца стопы у пациентов, которые уже перенесли операцию на контралатеральной стопе.

Материал и методы. В исследование вошло 42 пациента, которым была выполнена чрескожная коррекция двусторонней вальгусной деформации первого пальца стопы в разное время. Всего было 40 женщин и 2 мужчин; средний возраст на момент 1-й операции — 55,7 года, на момент 2-й операции — 56,7 года. Все пациенты через неделю после операции заполняли визуальную аналоговую шкалу (ВАШ) для измерения интенсивности боли. Каждый из них прошел клиническое обследование для оценки послеоперационного восстановления. Пациенты были случайным образом разделены на две группы. В группе А пациентам не сообщали никакой информации об интенсивности боли после операции на контралатеральной стопе. В группе В пациенты были проинформированы о том, что боль будет сильнее после операции на контралатеральной стопе. Пациенты обеих групп получали одинаковое анестезиологическое пособие и фармакологическое лечение в периоперационном периоде.

Результаты. Оценка боли по ВАШ составила 1,03 и 1,55 после первой операции и 4,57 и 0,50 после второй операции в группах А и В соответственно. Все пациенты указали на отсутствие боли через 7 дней после операции. О каких-либо существенных клинических изменениях не сообщалось.

Заключение. Психологические аспекты восприятия боли пациентами, перенесшими операцию на стопе, имеют большое значение. Влияние хирурга на исход лечения обусловлено не только его техническими навыками, но и возможностью влиять на индивидуальное восприятие пациентами результатов операционного вмешательства.

Ключевые слова: вальгусная деформация первого пальца стопы; *hallux valgus*; малоинвазивная хирургия; боль; ВАШ; удовлетворенность пациента.

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INTRODUCTION

Hallux valgus is one of the most common chronic foot complaints with a prevalence of 23% in adults aged 18-65 years (CI: 16.3-29.6) and 35.7% in elderly people aged over 65 years (CI: 29.5-42.0) [1]. Corrective surgery for *hallux valgus* is one of the most frequently performed surgical procedures with more than 150 surgical techniques but none of them has proven its superiority over the other [2]. In the last decades, percutaneous forefoot surgery has become increasingly widespread, providing better outcomes for patients, less post-operative pain, shorter scar length and lower risk of infection and wound complications [3].

Additional advantages of this surgical technique also include faster post-operative recovery with immediate full weight bearing [4, 5]. S.A. Isham from the USA was the first surgeon who described the percutaneous forefoot surgery, and then the Spanish specialists Mariano de Prado and Pau Golano exported it in Europe [6, 7]. The percutaneous surgical treatment of *hallux valgus* involves several procedures, and there is still no evidence to recommend one minimally invasive technique over another [8].

Despite the evolution of the surgical technique, sometimes patients complain of dissatisfaction even though the objective post-operative parameters do not demonstrate obvious complications. In this study, we evaluate post-operative pain following percutaneous *hallux valgus* correction and investigate how psychological adaptation can influence individual pain perception.

The aim of this study — to evaluate psychological implications for post-operative pain perception after *hallux valgus* surgery in patients who had already undergone contralateral foot surgery.

METHODS

Between January 2014 and December 2016, 42 patients treated for percutaneous *hallux valgus* correction in two different time periods were enrolled in the study. For inclusion, the patients had to suffer from isolated bilateral mild-to-moderate *hallux valgus* [9] with no lateral toes deformity. Patients with a history of prior or current chronic pain, neurological or psychiatric disorders were excluded.

The surgery on the second foot was performed 3 to 6 months after the first one. The same percutaneous surgical procedure was performed in all patients by the same surgeon. They were randomly divided into two groups: group A was not given any indications about post-operative pain compared to the contralateral foot; patients from group B were informed by the surgeon that the pain would probably be worse than in the previous surgery on contralateral foot. Both

groups received the same anesthesiological and pharmacological support in the peri-operative period (ankle bi-block with naropine 7.5% and mepivacaine 2.0% before surgery; acetaminophen 1000 mg twice a day for seven days after surgery).

A week after second surgery, all patients were administered the visual analog scale (VAS) to judge post-operative pain, and each of them was evaluated clinically to monitor post-operative convalescence at one and at two weeks.

Surgical technique

The patient was placed on the operating table in the supine position. The foot was prepped and draped in a standard aseptic manner.

A small 2-3 mm incision was made on the medial aspect of the first metatarsal. Under image intensifier control, a toothpaste-like mixture of bone and blood was removed using a wedge burr (exostosectomy). The distal osteotomy (subcapital — proximally to sesamoid bones) according to the Bösch technique [10] was then performed through the same incision, so as to allow lateral movement of the metatarsal head (WOS, i.e. without osteosynthesis) [11]. Through a lateral dorsal small incision the release of the tendon of the muscle abductor of the *hallux* was finally performed. A functional dressing completed the surgical act, keeping the foot in its correct position because no internal fixation was performed. A final visualization under fluoroscopy confirmed the right correction.

Specific measures have been taken to limit tissue damage according to current literature. The blades used (attached to Beaver-type handles) were sufficiently thin to guarantee high precision incisions without damaging vessels, nerves or skin [5]. In addition the low-speed high-torque motor system used in conjunction with cooled irrigation fluid and discontinuous activations reduced the temperature and the risk of thermal injury and necrosis [12] while using the burrs. These procedures finally take advantage of mini image intensifiers which are easy to handle and provide extremely accurate images by emitting radiation doses that are 10 to 100 times lower than those provided by the conventional image [5].

Post-operative management

In the immediate post-operative period, the patients received written instructions aimed at the adequate management of pain and local edema. The instructions included specific drugs, forced rest, full weight bearing in a flat stiff shoe and thromboembolic prophylaxis.

At one and two weeks, the same surgeon assessed the patient clinically and radiologically, noting a good *hallux valgus* correction in all cases. No major complications were observed in our series.

Statistical analysis

The statistical analysis was carried out using the SPSS software (SPSS Inc., Chicago, IL, USA). The VAS pain perception score was used as an outcome measure. To compare the outcome measure between groups A and B, we calculated changes from baseline as the percentage of variation $\{[(\text{follow-up value} / \text{baseline value}) \cdot 100] - 100\}$. After calculating changes from baseline, we repeatedly compared the results of group A and group B (difference of differences) through the Mann-Whitney U test. Throughout the statistical analysis, the significance level was set at 0.05.

RESULTS

The mean age of patients at the time of first surgery was 55.7 years and at the time of the second surgery — 56.7 years. Among 42 patients, there were 40 female and 2 male patients. The average VAS pain score was 1.03 (0.92 SD) and 1.55 (0.50 SD) after first surgery; 4.57 (2.09 SD) and 0.50 (0.62 SD) after second surgery for group A and group B, respectively. All patients reported no pain 7 days after surgery. These results show a significant difference ($p < 0.00001$) in pain perception compared to the preliminary information obtained during the pre-operative assessment.

DISCUSSION

The ability to objectively measure pain is an important component of health care, as it determines the effectiveness of medical interventions. The VAS was found to be accurate, valid, reliable and reproducible [13], and therefore it was chosen as the outcome measure in our study.

The relationship between a painful stimulus and pain perception is not linear as pain is modulated by individual emotional processes [14]. Affective modulation of pain is currently known in the literature: unpleasant emotions tend to increase the perception of the painful stimulus, differently from neutral or positive emotions [15, 16, 17, 18].

Memory also plays an important role in pain modulation. The researchers have found that a subject repeatedly exposed to pain develops a branched neural network for painful memories [19] and that activating pain projects in memory increases the pain perception of subsequent painful stimuli, compared to neutral information [20].

Thus, the pain perception is sensitive to various mental processes, such as someone's feelings and beliefs about pain, and it is not driven solely by harmful impact. More specifically, expectation seems to be one of the basic mechanisms in the cognitive modulation of pain [21].

The results of our study show a significant difference in pain perception compared to the

preliminary information obtained during the pre-operative assessment. This highlights how the concepts widely described in the literature are useful for the more specific management of post-operative pain in percutaneous *hallux valgus* correction.

In fact, the surgeon must not only take care of the technical practical part of the surgical operation, but also try to understand the patient's expectations and guide the perception of the post-operative outcome.

In this regard, it should be emphasized that it is essential to discuss expectations with the patient prior to surgery, as expectations themselves are the best predictors of post-operative satisfaction [22]. Failure to understand expectations leads to patient dissatisfaction [23]. This is particularly true in *hallux valgus* correction surgery: a high percentage (25-33%) of patients remain dissatisfied at follow-up, even if there is a functional improvement [24]. A thorough interview should be conducted with the patient also to evaluate the psychological component and specific personality traits. In fact, research suggests that a patient's subjective outcome after surgery may be influenced by certain individual personality profiles [25, 26, 27, 28]. Specifically, R. Radl et al. have shown that patients who, in the pre-operative time, had atypical traits (aggressive, impulsive or worried) were not completely satisfied even when faced with an objectively corrected *hallux valgus* deformity [29].

Study limitations

We recognize that this study has some shortcomings. Firstly, the follow-up period is very short (only 2 weeks); despite this, we think that 2nd week is a crucial period in the patient's perception of the overall outcome. Secondly, although we consider these results to be statistically significant, we believe that the study group is quite small. Therefore, we stress the need for further studies that would confirm the role of psychology in the surgery outcome and in the perception of pain.

CONCLUSION

The patients examined in our study, although presenting a memory of the pain developed following the first surgery, seem to be influenced by the indications of the surgeon provided preoperatively, which evidently influence their expectations and psychological aspect. Thus, not only the surgical procedure, but also information and dialogue with the patient are priorities in this type of treatment to achieve excellent post-operative satisfaction. This approach is useful in all cases, but it is recommended for psychologically fragile patients or for those with specific personality traits.

DISCLAIMERS

Author contribution

Bondi L. — study concept and design, data acquisition.

Otonello C. — data acquisition, analysis and interpretation, drafting and editing the manuscript.

Giuliani P. — data acquisition, editing the manuscript.

Bondi R. — study concept and design, data acquisition.

Giuliani L. — data analysis and interpretation, literature search and review, statistical data processing.

All authors have read and approved the final version of the manuscript of the article. All authors agree to bear responsibility for all aspects of the study to ensure proper consideration and resolution of all possible issues related to the correctness and reliability of any part of the work.

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ДОПОЛНИТЕЛЬНАЯ ИНФОРМАЦИЯ

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Бонди Л. — концепция и дизайн исследования, сбор данных.

Оттонелло К. — сбор, анализ и интерпретация данных, написание и редактирование текста рукописи.

Джулиани П. — сбор данных, редактирование текста рукописи.

Бонди Р. — концепция и дизайн исследования, сбор данных.

Джулиани Л. — концепция и дизайн исследования, поиск и анализ публикаций, статистическая обработка данных.

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