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Facial expression drawings and the full cup test: valid tools for the measurement of swelling after dental surgery

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Abstract

Assessment of postoperative swelling is subjective and depends on the patient's opinion. The aim of this study was to evaluate the validity of facial expression drawings and the full cup test and to compare their performance with that of other scales in measuring postoperative swelling. Fifty patients who had one of several procedures were included. All patients were asked to fill in a form for six days postoperatively (including the day of operation) that contained four scales to rate the amount of swelling: facial expression drawings, the full cup test, the visual analogue scale (VAS), and the verbal rating scale (VRS). Seven patients did not know how to use some of the scales. However, all patients successfully used the facial expression drawings. There was a significant difference between the scale that patients found easiest to use and the others ($p < 0.008$). Fourteen patients selected facial expression drawings and five the VRS. The results showed that the correlations between the scales were good ($p < 0.01$). Facial expression drawings and the full cup test are valid tools and could be used to assess postoperative swelling interchangeably with other scales for rating swelling, and some patients found facial expression drawings were the easiest to use. © 2016 The British Association of Oral and Maxillofacial Surgeons. Published by Elsevier Ltd. All rights reserved.

Keywords: Facial expression drawings; Full cup test; Swelling evaluation; Dental surgery

Introduction

Dental operations lead to a lot of discomfort from postoperative complications, and swelling with its subsequent release of inflammatory cytokines leads to increased permeability of vessels and accumulation of inflammatory exudate.^{1,2} We aimed to reduce the incidence and severity of swelling, and to do this we evaluated the effectiveness of our strategies. Among the subjective measurement scales, the visual analogue scale (VAS) is the most commonly used^{1,3-5} while the verbal rating scale (VRS) is less popular.^{6,7}

The facial expression drawings and full cup test have been suggested as ways to establish self-reported evaluations of pain that are reliable and valid.^{8,9} As far as we know this paper is the first to assess them in the evaluation of swelling

after dental operations. Our primary purpose was to evaluate their validity as scales for the patients to assess the amount of swelling and compare them with other scales. Our second aim was to find out which rating scale the patients found easiest to assess the degree of swelling.

Patients and methods

We studied patients who presented to the Department of the Oral Surgery, The Left Specialized Dental Centre, Mosul, Iraq, for evaluation and management of different but related dental problems. The ethics committee of the Iraqi Ministry of Health approved the study, and all the patients provided written informed consent.

Inclusion criteria were patients having any dental operations that required reflection of a flap and removal of bone. Exclusion criteria were: patients with any medical problems

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that would contraindicate the procedures, cognitive or mental disability, illiteracy, and those who refused to participate. Fifty patients were enrolled.

The scales were translated into Arabic and explained to the patients preoperatively. All operations were done under local anaesthesia. Postoperatively patients indicated their subjective perception of swelling on a form that contained the different scales for rating swelling. These were to be filled daily for six consecutive postoperative days in addition to the day of operation.

The VAS consisted of a horizontal line 100 mm long with 0 marked as “no swelling” and 100 marked as “worst swelling imaginable”. Patients were asked to make a mark on the line the position that best indicated their degree of swelling.

The VRS is a six-point scale that consists of a list of phrases (no swelling, mild swelling, moderate swelling, severe swelling, very severe swelling, and worst swelling imaginable), with an explanation of each phrase. Patients selected the single phrase that best characterised their swelling. Each phrase corresponded to a numerical score (0, 2, 4, 6, 8, or 10).

The facial expression drawing is a six-point scale, with six different faces that illustrate increasing degrees of swelling. Patients were asked to select the one expression that best characterised their swelling, from the face on the left-hand side (“no swelling”), to the one on the right-hand side (“worst swelling imaginable”). Each illustration corresponded to a numerical score (0, 2, 4, 6, 8, or 10).

The full cup test showed a drawing of a cup. The patients were told that the cup was completely empty when there was no swelling and completely full when the swelling is the worst imaginable. They were then asked to draw a horizontal line in the cup that corresponded to the amount of swelling. The score was calculated as: height of line/height of cup \times 10.

Patients were asked to mark the swelling scales daily. When they came to have the sutures removed and the wound inspected on the seventh postoperative day the forms were collected and data analysed using IBM SPSS Statistics for Windows (version 23, IBM Corp. Armonk, NY, USA). The significance of differences between the tests, and the degree of correlation, were assessed using the analysis of variance (one-way ANOVA), Pearson’s correlation coefficient, and the chi square test.

Results

Of the 50 patients enrolled only 47 returned the forms, 29 of whom were female and 18 male. Their mean (SD) age was 29 (12) years, range 10–65.

Seven patients did not know how to use some of the scales (one, five, and five for VRS, VAS, and full cup test, respectively). However, they all used the facial expression drawing correctly.

Only 40 patients successfully used all the scales, and the difference in ease of use was significant ($p < 0.008$). Twenty-

Table 1

Scales that patients found easiest to use.

Scale and measure	Number of patients and result
Facial expression drawings	14
Verbal rating scale	5
Full cup test	0
Visual analogue scale	0
No difference	21
Chi square	9.65
df	2
p value	0.008

Table 2

Analysis of variance among scales.

	Sum of square	df	Mean square	F	p value
Between groups	1.876	3	0.625	0.251	0.860
Within groups	59.819	24	2.492		
Total	61.695	27			

one patients found all the scales easy to use, while the facial expression drawings and VRS were selected by 14 and five patients, respectively (Table 1).

Table 2 shows no significant difference among scales ($p < 0.86$) and the scales were well correlated ($p < 0.01$) (Table 3).

Discussion

The extent of swelling is one of the chief indicators of the patient’s comfort during the postoperative period.⁵ Photography and computed tomography (CT) have been proposed as objective methods to measure postoperative swelling.¹⁰ However, they are neither cost-effective nor time saving. Stereophotographic techniques¹¹ are probably the most sophisticated described to date, but are too complex for clinical use.⁵ Craniometrics using flexible tape has been used in many studies^{12–14} but is obviously not as accurate as other objective methods for precise measurement of the volume of facial soft tissue.¹⁵

The most common way to measure swelling involves subjective evaluation using the VAS,^{1,3–5} which is both effective and reliable.^{16,17} It allows a wide choice of ratings and avoids imprecise descriptive terms.¹⁸ In addition, the data are continuous, normally distributed, and provide data for parametric analysis.¹⁹ We have used it to evaluate swelling and considered it as the standard against which the other scales were compared and against which their validity was tested.

You may wonder why we have tested other scales when we have the VAS, which is effective and reliable. It is important to realise that some see the VAS as difficult, as it requires the patient to equate the length of a line with the amount of swelling that they have,²⁰ and they need to concentrate hard.²¹ Five of our patients could not work out how to use the VAS.

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