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Role of Digital Planimetry in Wound Management

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Abstract

Wound measurement is an important aspect of wound management. Periodic wound measurement helps in assessing the effect of treatment protocol and in deciding further intervention. Digital Planimetry (DP) is an important tool for wound measurement. Using a square grid, digital image photograph and the Image-J software, the digital planimetry score is calculated and wound is assessed and treatment protocol finalised. Here we share our experience with the use of Digital Planimetry in wound management.

Keywords: Digital Planimetry; Wound Management; Photograph.

Introduction

The treatment of acute and chronic wounds remains a challenge even in this era of fast growing medical advancements. Today a number of regimens and treatment options are there for a clinician to choose from. Treatment decisions are made from clinical impressions and observations and the response of the wound to a chosen treatment option. In this aspect measurement of the wound dimensions and photographic documentation becomes important. Wound measurement provides objective information by which progress can be measured. Accurate wound measurements that signal improvement after 4-6 weeks are reliable indicator of wound healing. Digital planimetry is one of the reliable methods of wound measurements.

Materials and Methods

This study was conducted in the department of Plastic Surgery in a tertiary care institute during the period March-April 2019. Informed consent was taken from all participants included in the study. Here we studied the role of digital planimetry in wound management. Informed consent was taken from all participants of the study. A total of 5 patients were included in the study, 2 were cases of diabetic foot ulcer, 1 of Fournier's gangrene, 2 of thermal burns. Digital planimetry score was assessed periodically once at admission, during debridement and course of therapy and then at discharge. The measurements were done by 2 surgeons. The tools used were square adhesive 4x4 cm^2 with 16 square grids of 1 cm^2 each, an ordinary digital camera and Image J™ free open source software. The square adhesive was placed near the wound and wound photographs were taken. The wound photograph was then analysed using Image J™ software. The edges of the wound

were marked and the number of pixels falling under the square adhesive marker and marked wound were calculated. Since the dimensions of the square are known, it is possible to derive the exact size of marked area of wound. Following are the steps of calculating digital planimetry based measurements:

Step 1: Wounds to be photographed after placing the square grid next to the wound.

Fig. 1: Showing step 1

Step 2: Open the image using Image-J™ Software

Fig. 2: Showing details of step 2

Step 3: Select the grid in the image.

Fig. 3: Showing details of step 3

Step 4: Select Plugins-Analyse-Measure and set labels. The dimensions and pixels of the marker measured with the rectangle selection, analysed and labelled.

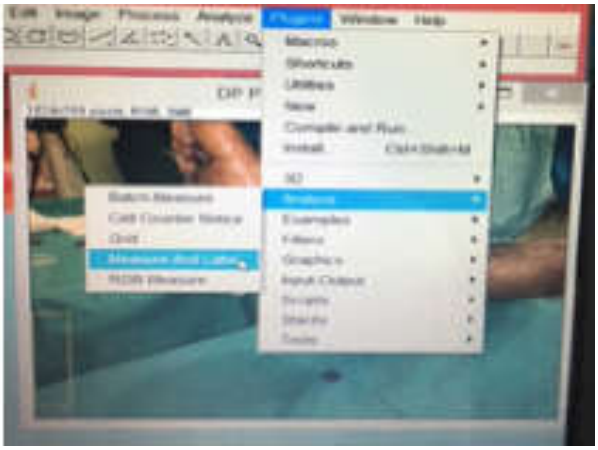

Fig. 4: Showing details of step 4.

Step 5: The output indicates the area under the grid.

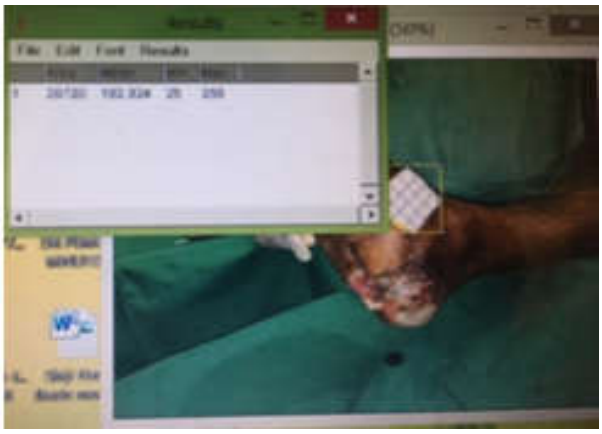

Fig. 5: Showing details about step 5.

Step 6: The wound edges marked with the free hand selection, analysed and labelled in a similar manner.

Fig. 6: Details about step 6.

Step 7: The ratio of the marker label and wound measurements give an accurate estimate of the

wound size.

Fig. 7: Showing details about step 7

Results

Out of the 5 patients studied 3 were males and 2 were females. 2 wounds were in the lower limb, 1 in the scrotum, and 2 in the upperlimb. All the wounds were measured with the help of digital planimetry and the area was measured at admission and at discharge or at 4 weeks whichever was the earliest. The measurement values were tabulated (Table 1).

S. N.	Digital Planimetry (DP) Score 1	Digital Planimetry (DP) Score 2
1.	24 cm^2	18.4 cm^2
2.	18.6 cm^2	8 cm^2
3.	14.8 cm^2	4 cm^2
4.	34 cm^2	32.6 cm^2
5.	12.4 cm^2	4 cm^2

The decrease in the DPscores at the end of 4 weeks indicated whether the wound was healing or more aggressive intervention or change in treatment plan is required. Out of 5 wounds 3 were healing well at the end of 4 weeks and 2 wound required change in the intervention plan for obtaining the desired results.

Discussion

Wound assessment is an important part of wound healing. Periodic wound assessment helps in proper management of the wound and making decisions regarding further intervention and for planning changes in the on-goingtherapy. Wound measurement is an integral part of wound assessment. Measurement and recording of wound area helps in assessing progress of wound healing. Various wound measurement techniques have been described in the past. The methods available today can be divided into contact and non-contact methods [1]. Some commonly used techniques are the Ruler method, the graph method or planimetry [2], computerised planimetry [3], digital planimetry [4,5] acetate method and sterophotogrammetry [6]. Here we used a simple method of wound measurement using a simple grid, clinical photo and image software.

Wound measurement at regular intervals helps the clinician to know the rate of wound healing and whether procedures like grafting would be required or not. The decrease in the wound size would indicate whether the wound is healing at a faster pace or would require a change in management protocol. It has been proposed in some studies that percentage change in wound area over a 4 week period of 30% or more is a good predictor of healing [7,8]. Measuring wound using clinical photograph is not routinely practised. Each time photograph has to be taken with the same camera with the same settings at a fixed distance. Even though it is cumbersome at times but it is a good method of assessing wound and is an important aspect in medico legal documentations.

There are only few studies available on the use of Image-J software and most of them are animal studies. This technique can be used in determining graft loss and patchy take of the graft and can also be used to assess features of real life images like facial analysis before surgery.

Conclusion

This is a preliminary study to assess the use of digital planimetry in wound management in a limited setting with limited number of cases, but yet it has been seen as an effective, easily reproducible, noninvasive method of wound measurement. A large multicentric, double blinded control study with statistical analysis is required to further substantiate the results.

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