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كلية الطب البيطري - جامعة أسيوط
رئيس القسم : أ.د/ عاطف عزت بلبل

THE ROLE OF CONTRACTION IN THE
HEALING OF FULL THICKNESS EXCISED SKIN WOUNDS
IN THE ABDOMINAL AND METACARPAL REGIONS OF THE DONKEY
(With One Table and Two Figures)

ملاحظات عن دور الانكماش في التئام جروح الجلد
في منطقتي البطن والعظام المشطية في الحمير

SUMMARY

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تم دراسة دور الانكماش في التئام جروح الجلد في منطقتي البطن والعظام المشطية
في خمس حمير خلال فترة ثلاثون يوماً .

ولقد وجد أن ٩٣.٦٦% من الحجم الأساسي للجرح قد تم التئامه في جروح منقطة
البطن بينما التئام ما يوازي ٣٢% من الجلد في منطقة العظام المشطية بواسطة انكماش
الجلد المحيط بالجروح .

The aim of the present work is to demonstrate and evaluate the role of contraction
in the healing of skin wounds at the abdominal and metacarpal regions of donkeys within
30 days postwounding.

MATERIAL AND METHODS

The present work was carried out on 5 male donkeys (weight of the same age and
weight (about 2 years and around 250 Kg.). Before starting the study, the donkeys were
given tetanus anti-toxin in a dose of 3000 IU subcutaneously. Under the effect of a local
infiltration anaesthesia using 2% procaine hydrochloride, two rectangular skin wounds were
created, under aseptic condition, one at the metacarpal region and the second on the lateral
abdominal wall in each animal. The wounds were 4.5 x 10 cm. Both wounds were cleaned
by normal saline irrigation and application of povidone iodine daily. The length and width
of the wound were measured initially and every 2 days for 30 days after wounding.

RESULTS

The overall mean of the values of wound measurements over a 30-day period are shown
in Table (1).
In both regions wound measurements were not changed within the first five days and
the wound edges moved rapidly between the fifth and 30th day and then they moved slowly.
The rate of contraction was not the same for all points on the circumference of the
created wound. The midpoints of the sides move more rapidly than the corners (Fig. 1).

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**OBSERVATIONS ON THE ROLE OF CONTRACTION IN THE
HEALING OF FULL-THICKNESS EXCISED SKIN WOUND
IN THE ABDOMINAL AND METACARPAL REGIONS OF THE DONKEY**
(With One Table and Two Figures)

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SUMMARY

In a group of 5 donkeys, the role of contraction in the healing of full-thickness excised skin wound in the abdominal and metacarpal regions of donkey was investigated within 30 days. It was found that about 93.66% from the original size of the abdominal wound and about 32% from the original size of a similar wound at the metacarpal region healed by contraction of surrounding skin.

INTRODUCTION

Wound contraction is the reduction of part or all of a wound defect by the movement of normal surrounding tissue towards its center (JAMIESON and KAY, 1969; PEACOCK and VAN WINKLE, 1976; MILNE, 1978; JOHNSTON, 1979; SWAIM, 1980 and SCHWARTZ *et al.*, 1984). The rate of wound contraction varies with the shape and location of the wound (MILNE, 1978; CHVAPIL *et al.*, 1979 and SWAIM, 1980).

The aim of the present work is to demonstrate and evaluate the role of contraction in the healing of skin wounds at the abdominal and metacarpal regions of donkeys within 30 days postwounding.

MATERIAL and METHODS

The present work was carried out on 5 male donkeys nearly of the same age and weight (about 5 years and around 250 Kg.). Before starting the study, the donkeys were given tetanus anti-toxin in a dose of 3000 I.U. subcutaneously. Under the effect of a local infiltration anaesthesia using 2% procaine hydrochloride, two rectangular skin wounds were created, under aseptic condition, one at the metacarpal region and the second on the lateral abdominal wall in each animal. The wounds were 40 x 30 mm. Both wounds were cleaned by normal saline irrigation and application of povidine iodine daily. The length and width of the wound were measured initially and every 5 days for 30 days after induction.

RESULTS

The overall mean of the values of wound measurements over a 30-day period are shown in Table (1).

In both regions, wound measurements were not changed within the first five days and the wound edges moved rapidly between the fifth and 20th day and then, they moved slowly.

The rate of contraction was not the same for all points on the circumference of the created wound. The midpoints of the sides move more rapidly than the corners (Fig. 1).

Table (1)
Wound measurements at the metacarpal and abdominal wall regions in donkeys

Day	Wounds of the metacarpal region		Wounds of the abdominal region	
	Length (mm.)	Width (mm)	Length (mm.)	Width (mm.)
0	40	30	40	30
5	40	30	40	30
10	39	29	34	26
15	37	27	27	19
20	36	25	20	13
25	36	25	15	10
30	34	24	10	8

Wounds on the abdominal region contracted at a rate nearly of 1.0-1.2 mm./day. Similar wounds on the metacarpal region contracted at a rate nearly of 0.2 mm./day.

At the 30th day, wounds of the abdominal region were reduced by about 93.66% from the original size (Table 1 and Fig. 1). In the metacarpal region the wounds were reduced by a about 32% from the original size (Table 1 and Fig. 2).

DISCUSSION

In both regions examination of the series of events which occurred post-wounding and wound measurements revealed that wound contraction does not begin immediately after wound induction and about 5 days were elapsed before movements of the edges can be started. The present findings were supported by the results obtained by PEACOCK and VAN WINKLE (1976), MILNE (1979), JOHNSTON (1979), SWAIM (1980) and SCHWARTZ *et al.* (1984) who recorded about 3-5 days without contraction of the edges of the wounds. This may be attributed to that an assembly of cells of energy source must be established before the acutal work of mobilizing skin edges begins (SCHWARTZ *et al.*, 1984).

It was found that in both regions the rate of wound contraction was not the same for periods during the 30 days of the study. This observation was confirmed by CHWARTZ *et al.* (1984) in his clinical study on human beings. He found that wound edges moved rapidly between the 5th day and 10th day, but it moved again slowly for 2 weeks. He added that the cause of this variation was not clear.

It was observed that the midpoints of the wound sides contracted more rapidly than the corners a finding which the observations of PEACOCK and VAN WINKLE (1976) and SWAIM (1980). This may be attributed to the variation in firmness of attachment of the different edges of the defect (SCHWARTZ *et al.*, 1984).

Wound measurements in this study indicated that the rate of contraction varied with the wound location as reported by MILNE (1978) and CHAVPIL *et al.* (1979). Inhiition of the rate of wound contraction in the metacarpal region my be due to formation of exuberant granulation tissue and the tension of the surrounding skin which equibrates with the pulling forces of contraction (WOLTON and NEAL, 1972).

The obtained results of wound measurements at the 30th day revealed that contraction works best in the wounds at the abdominal region and was sufficient to close about 93.66% of the entire wound, while in the wounds at he metacarpal region contraction was not sufficient and about 68% of the entire wound remained opened up to the thrity day. The effectiveness of the contraction process in producing complete wound closure are related to the

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amount of skin available in the given area of the body (PEACOCK and VAN WINKLE, 1976; SWAIM, 1980 and SCHWARTZ *et al.*, 1984). In the abdominal region where there is redundancy of skin, wound contraction can be extremely effective in closing wounds. In the metacarpal region maximal wound contraction can not close significant defect because there is no sufficient skin to stretch over the wound.

It is concluded that about 93.66% from the original size of full-thickness skin wound at the abdominal region and 32% from the original size of a similar wound at the metacarpal region were healed by the contraction of the surrounding skin during the period of experimentation.

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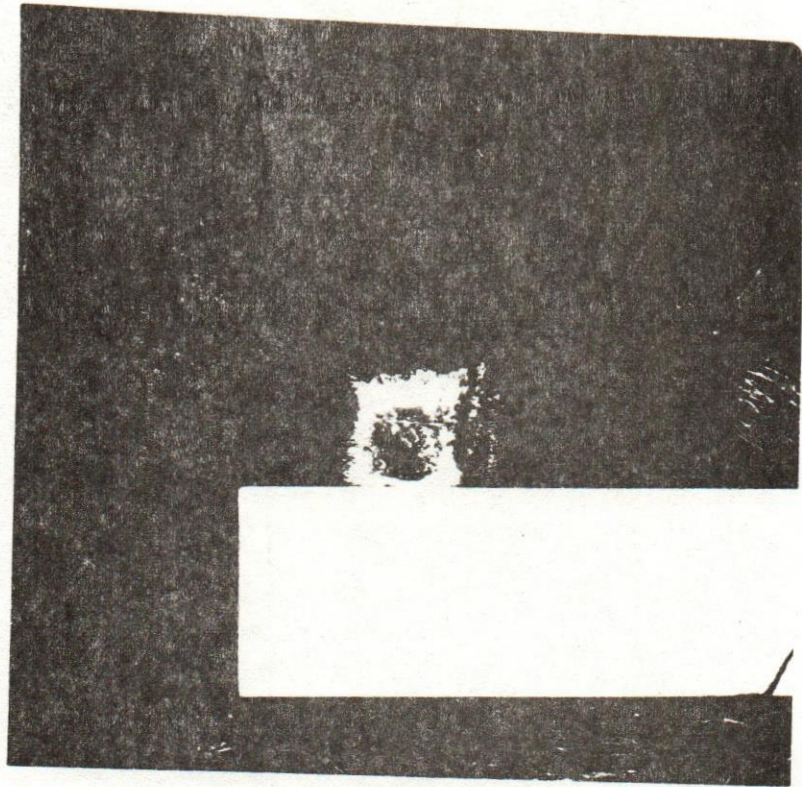


Fig. (1): The degree of contraction of the abdominal wound after 30 days.

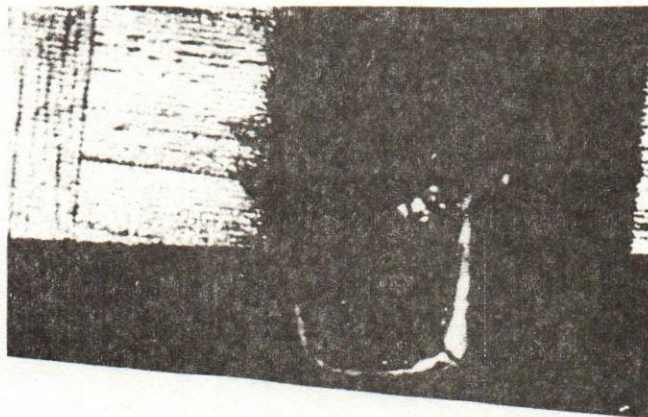


Fig. (2): The degree of contraction of the metacarpal wound after 30 days.

