Enhanced wound contraction and epithelization period in steroid treated rats: Role of pyramid environment

Surekha Kamath, S Gurumadhva Rao*, K Dilip Murthy, K L Bairy† & Surekha Bhat‡
Department of Physiology, Pharmacology* and Biochemistry‡, Melaka Manipal Medical College, Manipal 576104, India
and
Department of Pharmacology† Kasturba Medical College, Manipal 576104, India

Received 7 October 2005; revised 27 July 2006

Contribution and role of a pyramid/square box on the wound healing suppressant effect of dexamethasone was studied in rats of either sex using excision wound model to record the wound contraction rate and epithelization period. The results showed enhanced wound contraction rate and decreased epithelization period in the pyramid-exposed rats as compared to controls. Thus, it appears that pyramid environment facilitates the process of wound healing. Also, the wound healing suppressant effects of dexamethasone were significantly reduced.

Keywords: Dexamethasone, Excision wound, Pyramid environment, Square box

The pyramids of Egypt are the most famous of all the ancient monuments surrounded with mystery about its origin, religion and architecture. Pyramid models with proportional dimensions when centered on the true north-south axis, as that of Egyptian pyramids, can generate an energy field within it1, 2. The pyramids have been planned with mathematical and geometrical accuracy so as to create an energy force which is active within a pyramid and can do many things which are beneficial to both nonliving and living creatures including human beings3. Veterinary surgeon Dr. Hasneyn Mirza believed that the strange power of pyramid caused faster healing after a surgical procedure in horses4. Pyramidal environment is shown to enhance wound-breaking strength in an incision wound5 and hydroxyproline content in dead space wound6.

Glucocorticoids are widely used for the treatment of various diseases, despite their known side effects such as skin atrophy and immune suppression7 and wound healing8. This prompted the present investigation on the effects of pyramid environment on excision wound alone and in the presence of dexamethasone-induced delay in wound healing.

Materials and Methods

Dimensions of pyramid/square box — A wooden pyramid model and a square box (height of 20”, base of 30” and sides measuring 28.55”) as explained by Toth and Nielsen2 was used. Holes were drilled on all sidewalls for ventilation and a glass window was fixed on one of the sidewalls for observation. The square box was used to study whether the therapeutic powers of pyramid is due to closed cavity, or due to the shape. The pyramid/square box was positioned such that the walls faced north, south, east and west, while the corners aligned with north west, south west, north east, and south east9.

Animals— Healthy Wistar albino rats (48) of either sex, weighing 150-250g, bred locally were used. They were individually housed in clean polypropylene cages, maintained on standard conditions (12:12 hr L:D cycle; 25° ± 3°C; 35-60% RH). The rats were fed with standard chow diet (Pranav Agro Industries Ltd. Sangli, Maharashtra) and water ad libitum. They were starved for 12 hr before infliction of wounds.

Experimental procedure— Animals were divided into following 6 groups of 8 animals each: Group I [home cage control]; rats were kept outside the pyramid: Group II [pyramid control]; rats were kept inside the pyramid: Group III [square box control]: rats were kept inside the square box: Group IV [dexamethasone control]; rats were treated with dexamethasone kept outside the pyramid: Group V
[dexamethasone +pyramid]; rats were treated with dexamethasone kept inside the pyramid: Group VI [dexamethasone +square box]; rats were treated with dexamethasone kept inside the square box.

The wounding procedures were carried out using pentobarbitone anesthetized rats in these wound models, at the dose level of 30mg/kg bodyweight. Dexamethasone (4mg/2ml) was injected in the dose of 0.34mg/kg, intramuscularly, on the day of operation (‘0’ day) and 0.17mg/kg, thereafter on alternate days till wounds healed or 21st day whichever was earlier.

Excision wound model— A round seal of 2.5 cm in diameter was impressed on the dorsal thoracic region 5 cm away from the ears as described by Morton and Malone10. The entire full-thickness of skin from the demarcated area was excised. Wounds were cleaned with cotton swab soaked in 70% alcohol.

Contraction which mainly contributes for wound closure was studied by tracing the raw wound area on transparent paper every alternate day till wounds were completely covered with epithelium. These wound tracings were retraced on a millimeter scale graph paper, to determine the wound area. Wound contraction (WC) was calculated as a percentage change in the initial wound size i.e.

\[
WC(\%) = \frac{\text{Initialwoundsize} - \text{specifiedaywoundsize}}{\text{Initialwoundsize}} \times 100
\]

Epithelization period was monitored by noting the number of days required for eschar to fall away, leaving no raw wound behind.

Statistical analysis— Results are expressed as mean ± SD. One-way analysis of variance (ANOVA) followed by Bonferroni’s post-test was applied. \( P \) values <0.05 were considered as significant.

Institutional Ethics Committee’s approval and clearance were obtained before starting the experiments.

Results and Discussion

The results (Table 1) showed that the epithelization period was reduced in pyramid exposed groups (Group II), when compared to home cage (Group I)/square box (Group III) exposed groups. In dexamethasone treated home cage (Group IV) and dexamethasone treated square box animals (Group VI), there was delayed epithelization. But it was overcome by the pyramid effect, since there was no significant difference between dexamethasone treated pyramid group (Group V) and home cage control group (Group I).

The percentage decrease in the wound surface area was found to increase in a time-dependent manner in

Table 1— Effect of pyramid/square box exposure alone and in presence of dexamethasone on rate of wound contraction of excision wound model [Values are mean ± SD from 8 animals in each group]

<table>
<thead>
<tr>
<th>Groups</th>
<th>Period of epithelization in days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Home cage</td>
<td>21.3 ± 4.72</td>
</tr>
<tr>
<td>Pyramid exposed</td>
<td>16 ± 2.6 a*</td>
</tr>
<tr>
<td>Square box exposed</td>
<td>20.8 ± 3.3 b*</td>
</tr>
<tr>
<td>Dexamethasone control</td>
<td>31.1 ± 2.08 a** b** c**</td>
</tr>
<tr>
<td>Dexamethasone pyramid</td>
<td>19.2 ± 3.24 d***</td>
</tr>
<tr>
<td>Dexamethasone square box</td>
<td>30.7 ± 4.8 5<em>a</em>** b** c** e***</td>
</tr>
</tbody>
</table>

P values: *<0.05, **<0.01, ***<0.001

\( a \) vs. home cage, \( b \) vs. pyramid exposed,
\( c \) vs. square box exposed, \( d \) vs. dexamethasone control,
\( e \) vs. dexamethasone pyramid.

Table 2— Effect of pyramid environment alone and in presence of dexamethasone on rate of wound contraction of excision wound model [Values are mean ± SD from 8 animals in each group]

<table>
<thead>
<tr>
<th>Groups</th>
<th>Percentage of wound contraction by day</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Home cage</td>
<td>13.88 ± 7.7</td>
</tr>
<tr>
<td>Pyramid exposed</td>
<td>25.66 ± 6.44 a*</td>
</tr>
<tr>
<td>Square box exposed</td>
<td>11.58 ± 9.23 b*</td>
</tr>
<tr>
<td>Dexamethasone control</td>
<td>5.24 ± 4.29 b**</td>
</tr>
<tr>
<td>Dexamethasone pyramid</td>
<td>13.49 ± 7.89 b</td>
</tr>
<tr>
<td>Dexamethasone square box</td>
<td>7.25 ± 6.27 b**</td>
</tr>
</tbody>
</table>

P values: *<0.05, ** <0.01, *** <0.001

\( a \) vs. home cage, \( b \) vs. pyramid exposed,
\( c \) vs. square box exposed, \( d \) vs. dexamethasone control,
\( e \) vs. dexamethasone pyramid.
all the groups (Table 2). Significantly higher rate of wound contraction was observed in pyramid-exposed rats (Group II) on the first week of wound as compared to home cage rats (Group I) and the rate of wound contraction reached 90% by 12th day. In dexamethasone treated home cage (Group IV) and dexamethasone treated square box animals (Group VI), the wound contraction was markedly delayed throughout the study period. The process of wound contraction was faster in dexamethasone treated pyramid exposed rats (Group V), by the second week. Wounds in these animals contracted to the same extent as the home cage animal wounds (Group I).

In the present study in both control and drug treated groups, pyramid environment showed decreased epithelization period. Significantly higher rate ($P<0.001$) of wound contraction was observed in dexamethasone treated pyramid exposed rats as compared to dexamethasone treated home cage/square box exposed rats.

Pyramid exposure significantly reversed epithelization delaying effect of dexamethasone. Widely read articles in the popular press have claimed that the energy within the pyramid is greater than outside and this field tends to produce healthier or healing states and it can be assumed that the frequencies generated raises resonant level of cells, tissues and organs closer to their optimal level of functioning. Although these are semi-scientific claims and the exact mechanism by which a pyramid model works, needs to be scientifically elucidated, the outcome of the investigations in this scientific study does give some support to the above claim. Further, earlier scientific studies with pyramid models have also reported that pyramid exposure promotes better wound healing and reverses the action of dexamethasone in maturation and organization of formed collagen in rats. Based on these reports and the results of the present study, it can be said that pyramid exposure promotes better healing of not only incision and dead space wounds but also excision wounds. Bhat et al have reported that exposure of rats to pyramid environment increases antioxidant defence which in turn reduces oxidative stress. Since low levels of antioxidants accompanied by raised levels of markers of free radical damage are known to play a significant role in delaying wound healing in rats, it can be hypothesized that in this study, pyramid exposure, by increasing the efficiency of the antioxidant system, reduced the epithelization period during wound healing.

The pyramid environment antagonized the actions of dexamethasone to a great extent, which was not seen in the dexamethasone treated rats kept in square box. Since square box results were almost in same line with the home cage control groups, confirming that effects of pyramid exposure were not just due to a closed cavity but were due to the shape.

In conclusion, it can be said that pyramid environment reduced the period of epithelization and promoted the rate of wound contraction in both control and drug treated rats. This encourages one to use the pyramid as a therapeutic device in patients receiving anti-inflammatory steroid therapy. However, further work needs to be carried out to assert that pyramid exposure does not antagonize the anti-inflammatory action of steroids in such patients. Studies also need to be carried out to understand the interaction between pyramid environment and its energy in the improved healing process.

### References