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HEALING OF EXPERIMENTALLY TRANSECTED FACIAL NERVE IN DONKEYS

(With 10 Fig.)

By

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التئام العصب الوجهي بعد تجربة قطعه في الحمير

مجموعات التجريبية ، هارون يوسف ،

عربي نصار

أجريت الدراسة على عدد ٣٦ من ذكور الحمير السليمة مظهرياً ، حيث قسمت الحيوانات إلى ثلاث مجموعات متساوية . واستخدمت خيوط الحرير لتوصيل العصب بعد قطعة في المجموعة الأولى . وفي المجموعة الثانية استخدمت خيوط الديكسون المغلفة ، أما المجموعة الثالثة فقد ترك العصب المقطوع بدون توصيل ولكن قطبت الأنسجة المحيطة به على شكل أنبوبة حول العصب المقطوع .

وقد قورنت النتائج أكلينيكيًا . وباثولوجيًا بعد العملية وحتى ستة أشهر . أظهرت النتائج أن قطع العصب الوجهي يؤدي إلى ارتخاء الشفة السفلى والتواء الشفة العليا تجاه الناحية السليمة كذلك يؤدي إلى عدم تناسق فتحتى الأنف حيث تفقد الفتحة الأنفية في ناحية العملية قدرتها على الاتساع الطبيعي أثناء التنفس . هذا وبعد توصيل العصب المقطوع تبدأ الأعراض الناتجة عن قطع العصب في الاختفاء التدريجي حتى يعود الحيوان إلى وضعه الطبيعي خلال ستة شهور من العملية . وفي حالة عدم خياطة العصب . وخياطة الأنسجة حوله على هيئة أنبوبة حدث شفاء لبعض الحالات ولكن لم يظهر أى تحسن على البعض الآخر لذلك لا ينصح باستخدام هذه الطريقة . هذا ولم يلاحظ وجود فروق بين استخدام خيوط الحرير وخيوط الديكسون المغلفة لتوصيل العصب الوجهي .

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SUMMARY

The study was carried out on 36 male donkeys. The animals were divided into 3 equal groups, where each group was divided into 4 subgroups of equal number. The operations were done unilaterally on the right side of the head at the level of the tempromandibular articulation. The facial nerve trunk was transected, then epineurial neuroorrhaphy of the nerve trunk was performed using silk in the first group or dextron in the second group. In the third group the nerve alignment was done by suturing the surrounding tissues in the form of a tube around the nerve trunk. The clinical findings were recorded. The animals of the different subgroups were euthanized 1, 2, 4 and 6 months postoperatively, where the facial nerve at the operative site was examined macro and micromorphologically. After facial neurotomy the lower lip at the operated side appeared relaxed. The upper lip became deviated towards the sound side. The nasal opening of the sound side appeared dilated but the opening of the operated side was narrow. While the improvement of the clinical effects of facial neurotomy began to appear within 2 months after neuroorrhaphy, the regain of the normal condition took about 6 months to be completed. Histopathologically, the suture material had no effect on the process of the nerve regeneration. Suturing of the surrounding tissues in the form of a tube around the nerve trunk appeared to be insufficient technique for facial nerve regeneration.

INTRODUCTION

Peripheral nerve injuries may result from simple compression crushing, stretching, laceration or complete transection. Although peripheral nerve injuries are rarely life-threatening, the consequences may be devastating if these injuries are not treated appropriately (LARSEN and POSCH, 1958; LEHMAN and HAYES, 1967; SINGH et al., 1979 and BOJRAB, 1983). Equines may suffer from facial paralysis as a result of trauma to the superficial branches of the nerve as it crosses the mandible. Acute head trauma that cause fracture and haemorrhage

into the petrous temporal bone, otitis media-interna, guttural pouch infection and osteoproliferative lesions at the articulation of styloid bone with the temporal bone are other causes of facial paralysis in the horse (FRASER *et al.*, 1986). Many techniques were described for repairing injured peripheral nerves, yet no single technique has proved to be conclusively superior (BOJRAB, 1983).

MATERIAL and METHODS

The present study was carried out on 36 male donkeys. The animals were apparently healthy; 18 months to 3 years old and 60 to 150 Kg weight. They were divided into 3 groups each of 12 animals.

Group I : Facial nerve anastomosis using silk.

Group II : Facial nerve anastomosis using dextron.

Group III: Facial neurotomy.

The operations were performed under effect of thiopental intravenous anaesthesia of the chloral hydrate deeply narcotized animals. The facial nerve was exposed through a skin incision about 2.5 fingers breadth distal to the temporo-mandibular articulation. The nerve trunk lies above the skin incision. After careful dissection of about 1.5 cm of the nerve trunk, neurotomy was performed. Epineurial neurotomy was performed using 6/0 silk in group I and Dexon in group II. The nerve was left unsutured in group III, but the surrounding tissues were closed in the form of a tube around the cut nerve. The subcutaneous tissue was closed by simple continuous suture using silk 6/0 and skin was coaptated by mattress sutures using silk No. 0. The animals were given the prophylactic dose of antitetanic serum (1500 I.U.). The skin stitches were removed 8 days postoperatively. The animals were observed, where the clinical effects were recorded.

The animals of each group were divided into 4 subgroups. The animals of the different subgroups were euthanized 1, 2, 4 and 6 months postoperatively, where the facial nerve at the operative site was examined macro and micromorphologically.

RESULTS

Epineurial neurotomy of the facial nerve could be performed using silk and Dexon plus sutures without tissue drag (Group I & II). Postoperatively, on the second day it was noticed that food was accumulated between the cheek teeth and the cheek, leading to bulging of the skin longitudinally at the

level of the cheek teeth of the operated side. There was asymmetry between the openings of the nostrils. The upper lip was deviated toward the non operated side while the lower lip on the operated side was relaxed (Fig. 1).

The accumulation of food between the cheek and cheek teeth began to decrease 10 days postoperatively and no food accumulation was observed within two weeks. The improvement in shape and position of the nostrils and lips began to be noticed 2 months postoperatively (Fig. 2). After the elaps of 6 months the animals appeared more or less normal where there was great improvement in the shape and position of the nostrils and lips (Fig. 3).

After facial neurotomy (Group III) the gap between the proximal and distal end of the nerve was 2 to 3 millimeters. Improvement in the shape and position of the nostrils and lips was observed in 4 animals, 2 months postoperatively. Great improvement was observed in 2 animals, 4 months postoperatively. One animal showed no improvement in the position and shape of the nostrils and lips after the elaps of 6 months postoperatively (Fig. 4).

Macromorphologic examination of the anastomosis site showed that neuroma formation was marked one month postoperatively but was slight after the elapse of 6 months (Fig. 5 & 6). Malunion and overlapping of the two ends of the nerve trunk at the neurotomy site with false neuroma formation around the proximal end was detected in one case, 6 months postoperatively (Fig. 7). It was observed that this case was of that animal which showed no improvement in the shape and position of the nostrils and upper and lower lips.

Microscopically, nerve regeneration began to be observed in all the cases 2 months after neurorrhaphy (Fig. 8). The regeneration process was greatly improved 4 months postoperatively after facial neurorrhaphy with no regard to the suture material (Fig. 9). The complete nerve regeneration was observed in all cases of facial neurorrhaphy 6 months after the operation, where the nerve fibres were arranged regularly with typical schewan cell regeneration (Fig. 10).

DISCUSSION

Traumatic injury to a nerve is the primary indication for the surgical intervention. The nerve not only may be injured in an open wound but may suffer from contusion or laceration in bruising injuries or may be affected by the displacement of a bone fragment in fractures. It may be compressed by scar

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tissue, bone callus or the involvement of a new growth (OEHME and PRIER, 1974).

Although the improvement of the clinical changes which resulted after facial neurotomy in donkeys began to be remarked within 2 months after neurorrhaphy, the regain of the normal condition took about 6 months to be completed.

While, it was stated by BROWN and BUTLER (1975) that the time required for healing of the cut nerve in cat is between 2 and 32 weeks BOYD (1961) recorded that complete restoration of function seldom occurs in less than 3 to 4 months. The nerve regeneration after facial anastomosis in donkeys began 2 months postoperatively, but complete nerve regeneration was detected within 6 months.

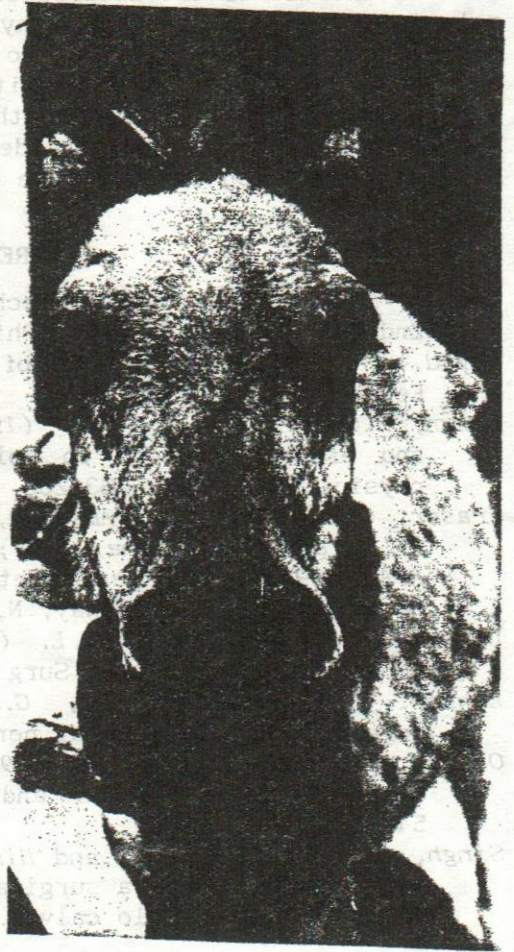
Although no difference seemed to be observed clinically between the use of the absorbable and the non absorbable suture material for facial neurorrhaphy, yet the absorbable one might be preferred on the bases that no suture material will remain to act as a foreign body after its absorption. The closure of surrounding tissues around the cut nerve trunk without neurorrhaphy is not to be considered a sufficient technique for nerve regeneration even in case of the limited movement of the operative site.

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Fig. 1- A donkey, on the second day after facial neurotomy and neurorrhaphy. There is obvious change in the shape and position of the lips and nasal openings.

Fig. 2- The improvement in the shape and position of the lips and nostrils began to be noticed 2 months after facial neurorrhaphy.



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Fig. 3- The shape and position of the lips and nostrils appear more or less normal 6 months after facial neurorrhaphy.

Fig. 4- A donkey with right side facial neurotomy 6 months postoperatively. No improvement in the shape and position of the lips and nostrils did occur where no neurorrhaphy was done.



Fig. 5- A very slight neuroma, 6 months after facial anastomosis using 6/0 silk sutures.

Fig. 6- A slight neuroma, 6 months after facial anastomosis using 6/0 coated Dexon sutures.



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Fig. 7- Malunion with false neuroma formation, 6 months postoperatively when the nerve trunk was left without neurorrhaphy.

Fig. 8- A ling. section showing the beginning of the nerve regeneration, 2 months postoperatively. (H&E X 63).



Fig. 9- The regeneration process was greatly improved, 4 months postoperatively. (H&E X 63).

Fig.10- A complete nerve regeneration, 6 months postoperatively. (H&E X 63).

