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**COMPARATIVE STUDIES ON DIFFERENT METHODS
OF SURGICAL CORRECTION OF EXPERIMENTALLY
INDUCED PAROTID DUCT FISTULA**
(With 7 Figs.)

By
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دراسة مقارنة للطرق المختلفة للعلاج الجراحي لانسور القناة اللعابية

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تم عمل ناسور للقناة اللعابية في عدد 14 حمار وتم تقسيمهم الى مجموعات أُجرى عليهم الطرق المختلفة للعلاج الجراحي لانسور القناة اللعابية وهي قطب لفتحة الناسور، الترقيع الجزئي للقناة، ربط القناة وأخيراً حقن محلول اللوجلز وربط القناة. ولقد وجد أنه حدث التئام بالفرض الأول في عدد حيوانين من ثلاثة في المجموعة الأولى، أما في المجموعة الثانية فقد حدث التئام في كل الحيوانات مع المحافظة على وظيفة الغدة النكفية أيضاً لم يلاحظ أي ضمور في الغدة النكفية في المجموعة الثالثة بعد ربط القناة فقط حتى 60 يوماً بينما لوحظ ضمور كامل في حيوانات المجموعة الرابعة بعد ربط القناة وحقن المادة المهيجية ونستطيع أن نستخلص من هذا البحث أن طريقة الترقيع الجزئي للقناة اللعابية على الطريقة المثالية لعلاج الناسور مع الاحتفاظ بوظيفة الغدة إما عندما يكون المحافظة على وظيفتها غير مطلوب فيمكن عمل الربط بعد حقن محلول مهيج في القناة اللعابية والذي يؤدي الى ضمور كامل لها في مدة شهرين.

SUMMARY

Parotid duct fistulae were experimentally induced in 14 donkeys. Animals were divided into four groups where different methods of surgical corrections namely freshening and suturing, segmental reconstruction, duct ligation and destruction of the function of the parotid salivary gland with duct ligation were performed.

Healing of the fistulae was accomplished by first intention in 2 out of 3 animals of the first group. Complete healing was observed in group two with preservation of the function of the gland. In group three

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signs of gland atrophy were not detected in all animals 60 days after duct ligation. Injection of lugol's solution with duct ligation leads to complete gland atrophy within 2 months in group 4.

In conclusion, segmental reconstruction of the parotid salivary duct was recommended when the function of the gland is aimed to be preserved. When destruction of the function of the gland is suggested, ligation of the duct after injection of irritant material was recommended.

INTRODUCTION

Salivary duct fistula is not uncommon disease in different domestic animals. It may be due to a wound of the Stenson's duct or one of its radicles (DIEULAFE, 1918; FRANK, 1961 and O'CONNER, 1982). Accidental traumatism, surgical incisions as in opening of an abscess, removal of a neoplasm or excising flaps for an autoplasty may be the cause of fistulous lesions.

Different methods were suggested for treatment depending upon the seat of fistula, the time elapsed and if the function of the gland was to be preserved or not (DIEULAFE, 1918; DICKINSON, 1927; BUTTER and GUINAN, 1933; SOM, 1971 and O'CONNAR, 1982).

The purpose of the study reported here was to evaluate the efficacy of different methods for surgical correction of experimentally induced parotid duct fistula.

MATERIAL and METHODS

Parotid duct fistula was performed ventral to the level of the horizontal ramus of the mandible under effect of chloral hydrate narcosis in 14 donkeys.

After clipping of the hair at the seat of operation and without application of any antiseptic precautions, a 3 cm cutaneous incision was performed at the level of the parotid duct. The duct was identified and 2 cm longitudinal incision was conducted in its wall. Animals were kept for two weeks under normal environmental conditions without any wound management or dressing and then examined for fistulous formation.

Spontaneous healing occurred in 2 cases and 12 animals developed salivary fistulae. These animals were divided into four groups each of 3 animals. The following methods for treatment were conducted on each group.

1 - Freshening and suturing:

The edges of the parotid duct wound were exposed by blunt and sharp dissection. Debridement was performed using fine scissors and then the edges were coaptated

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with simple continuous suture using chromic catgut No 3/0 with eyeless needle. The skin wound was trimmed and coaptated as usual.

2 - Segmental reconstruction of the parotid duct:

A 6 cm piece of polyethylene urethral catheter (3 mm in diameter) was prepared. A flange was performed on both sides of the tube, 1 cm from both ends. The tube was introduced into the proximal part of the duct through the fistula opening and then the other end was introduced into the distal part. Silk ligation was performed on both sides at the inner aspect of the flanges. The skin wound was trimmed and simple interrupted stitches were applied.

3 - Ligation of the duct between the parotid gland and fistula opening:

A metal probe was introduced into the duct via the fistula opening and directed caudad to facilitate its detection. The duct was exposed through a cutaneous incision, 3 cm caudad to the level of the fistula. The probe was removed and a delicate ligation of the duct was applied using silk No 0 at two levels. The skin and subcutaneous tissues were coaptated as usual. The original seat of salivary fistula was left to heal by second intention.

4 - Distraction of the function of the parotid salivary gland by direct injection of irritant materials through its duct:

A cannula was introduced into the duct lumen via the fistula opening and directed caudad. The wall of the duct was pressed firmly around the cannula by silk ligature without knotting. 10 ml of Lugol's solution was slowly injected retrogradely then the cannula was removed and the ligature knotting was completed to prevent back flow of the solution.

Animals were clinically observed for 3 months in group 1 & 2 then postmortem examination was performed mainly for detection of the patency of the parotid duct. Clinical signs were recorded for animals in group 3 & 4 for 2 weeks up to 3 months and then postmortem and histopathological examinations were performed to evaluate the degree of distraction of function of the salivary glands.

RESULTS

Group 1:

Healing of the fistulae was accomplished by first intention within 7-10 days in two animals. No signs of swelling were observed at the seat of fistula opening. In one animal recurrency was recorded at the fourth day after correction. Trials for freshening and resuturing failed and the animal was subjected to another method of correction then discarded from the experiment. Postmortem examination revealed comp-

lete patency of the duct at the seat of operation with partial stenosis and thickening of the duct wall.

Group 2:

Slight inflammatory swelling at the seat of reconstruction was observed at the first 3 days which gradually subsides later on. Healing of skin wound was accomplished by first intention within 7-10 days. Postmortem examination revealed presence of fibrous tissue formation around the polyethylene tube specially at the seat of silk ligature. Examination for patency revealed absence of leakage.

Group 3:

Healing of skin wound at the seat of duct ligation was accomplished by first intention within 7-10 days postoperatively. Healing at the seat of fistula opening occurred by second intention. Postmortem examination revealed presence of fibrous tissue formation at the seat of duct ligation. The parotid duct was dilated and increased in size. The dilatation became more pronounced at 30 & 60 days after ligation. The content was thick honey-like saliva. The parotid gland was slightly decreased in size when compared with the healthy side. Histopathologically, slight cystic dilatation of both interlobular and intralobular ducts were observed at 60 days. The dilated ducts were lined by normal cuboidal epithelium. The salivary acini were normal in size and shape. Myxomatous degeneration was observed at the connective tissue stroma. The capillary endothelium appeared swollen and vacuolated. No signs of gland atrophy was detected up to 60 days post ligation (Fig. 1).

Group 4:

The parotid region showed slight swelling, hotness and tenderness 3 days post-injection. Slight increase in body temperature was recorded. These signs start to disappear at the fourth day. 10 days after injection no signs of inflammation were detected at the parotid region. The seat of fistula completely healed and was replaced by scar tissue formation. Postmortem examination at 15 days revealed presence of slight adhesions between the gland and surrounding structures. The glandular tissue appeared oedematous and pale yellow in colour. At 30 days, the gland was decreased in size as compared with the healthy side. Two months later the process of glandular atrophy was evident and the gland was nearly replaced by fibrous tissue formation (Fig. 2). The parotid duct was dilated about 5 times its normal diameter and filled with watery turbid fluid (Fig. 3).

Histopathological examinations, 15 days postoperation revealed that the majority of the ducts were cystically dilated and lined by flattened epithelium. Few ducts still showed vacuolar degeneration of the lining epithelium (Fig. 4). Early fibroblastic cell proliferation was observed in the periacinar and periductal connective tissue stroma (Fig. 5). The glandular stroma suffered from myxomatous degeneration (Fig. 6). The

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acini were healthy and appeared separated by myxomatous stromal changes. After 30 and 60 days mature fibrous connective tissue formation was observed in some gland lobules. The glandular parenchyma appeared atrophic with remnants of some dilated ducts and involved acini (Fig. 7).

DISCUSSION

Parotid duct fistula is not a severely progressive disease. The usual reasons for requesting treatment are the bad appearance of the animal, contamination of food stuff with discharging saliva and the frequent needs for cleaning it.

Many possibilities for treatment are available. Freshening and suturing of the wounded duct can be only applied in recent cases in which no fibrous and callus tissue formations are present at the seat of fistula opening. However, suturing of the duct is a tedious process as its diameter do not usually exceed 3-4 mm. Segmental reconstruction of the parotid duct using polyethylene tube appears more easier and quicker in application. In addition, the function of the gland was preserved. Ligation between the fistula and the parotid gland (EMMELIN, *et al.* 1974) is also considered to be a simple technique, however, surgical exposure and detection of the duct may be somewhat difficult to general practitioner. Postmortem examination, 3 months post-ligation revealed absence of gland atrophy in our present study. Injection of irritant materials through the duct toward the gland before its ligation leads to complete atrophy of the gland within 3 months. However, some undesirable clinical signs as swelling at the parotid region and elevation of body temperature may be distressing to the animal and owner for the first 10 days postoperatively. Loss of function of one parotid gland may be of no clinical significance.

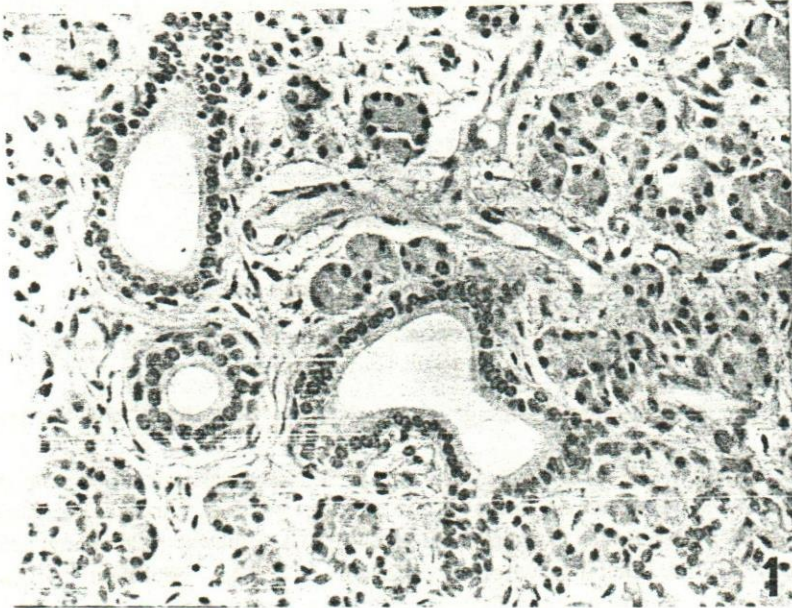
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LEGENDS

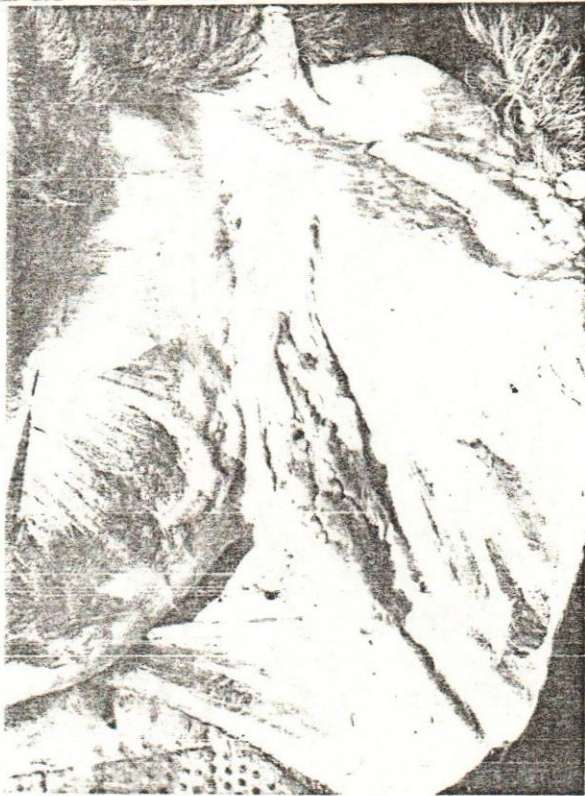
- Fig. (1):** Showing dilatation of the ductules with normal cuboidal epithelial lining. The glandular acini were normal in size and shape. Parotid gland of a donkey, 1 month post-ligation of its duct (H.E., x 25).
- Fig. (2):** Showing dilatation of parotid duct, 2 months post-injection of Lugol's solution and duct ligation in a donkey.
- Fig. (3):** Atrophy of parotid salivary gland, 2 months after retrograde injection of Lugol's solution.
- Fig. (4):** Showing cystically dilated ducts lined with flat epithelium. Some ducts show vacuolar degeneration. Parotid gland of a donkey 15 days after Lugol's injection and ligation (H.E., x 16).
- Fig. (5):** Showing duct metaplasia and periductal and stromal reaction of lymphoid cells, few plasma and mast cells. Parotid gland of donkey, 15 days after Lugol's injection and duct ligation (H.E. x 40).
- Fig. (6):** Showing early fibroblastic stromal proliferation and myxomatous degeneration. Parotid gland of donkey 15 days after Lugol's injection and duct ligation (H.E. x 40).
- Fig. (7):** Showing total gland fibrosis and atrophy of the gland parenchyma. Parotid gland of donkey, 1 month after Lugol's injection and ligation (H.E. x 25).



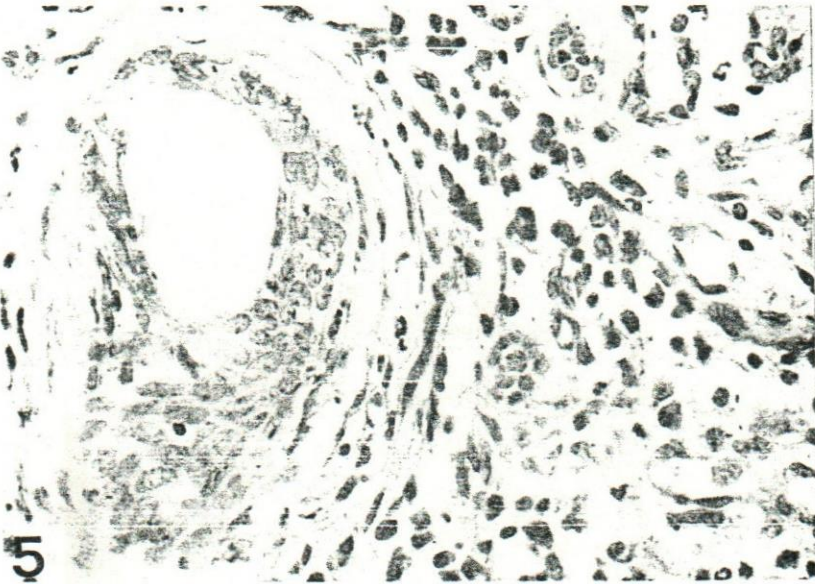
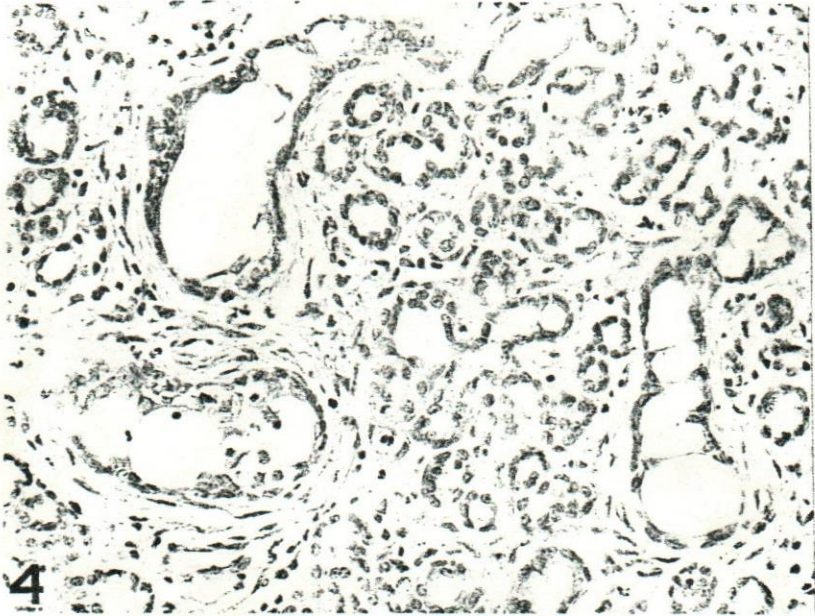
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