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CONJUNCTIVORALOSTOMY AND CONJUNCTIVORHINOSTOMY FOR RELIEF OF EPIPHORA IN DONKEYS (With 8 Figures)

By

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توصيل غرفة الملتحمة السفلية للعين الى تجويف كل من الفم والأنف
لتصريف الدموع في الحمير

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أجريت هذه الدراسة تجريبياً على عدد ١٨ حماراً قست بالتساوى الى ثلاث مجموعات حيث تم توصيل غرفة الملتحمة السفلية بتجويف كل من الفم والردب الأنفي والجيب الأنفي الفكي من خلال قنوات تحت الجلد ولاجراء مثل هذه العمليات تمت دراسة تشريحية مستفيضة لمناطق تلك العمليات على عشرة رؤوس من الحمير. وقد تم اجراء طريقتان في كل مجموعة ، احدهما مباشرة حيث تكون فتحتي الغشاء للقناة المصطنعة جراحياً مفتوحة مع تثبيت أنبوبة البولاي ايثيلين بداخلها من بداية العملية حتى تمام التأمها أما الطريقة الأخرى يتم فيها دفن أنبوبة البولاي ايثيلين داخل القناة المصطنعة جراحياً تحت الجلد من خلال جرحين بالجلد (احدهما اسفل مجرى العين مباشرة والآخر يختلف حسب نوع العملية ، فبما أن يكون أعلى مستوى تجويف شفة الفم العلوية مباشرة أو أعلى مستوى سقف الردب الأنفي مباشرة أو الى الجيب الأنفي الفكي حيث تم خياطة تلك الجرحين مباشرة بعد تثبيت الأنبوبة داخل القناة المصطنعة وتغطيل معلقة الى أن يتم التأمها ، ثم توصل بعد ذلك بفتح غشاء الملتحمة من أعلى وفتح غشاء تجويف شفة الفم أو غشاء سقف الردب الأنفي من أسفل . ففي المجموعة الأولى تم توصيل غرفة الملتحمة السفلية للعين الى تجويف الفم ، وقد وجد أن التوصيل المباشر قد يعقبه التهاب صديدي للقناة المصطنعة جراحياً أثناء فترة الالتئام نتيجة العدوى المكتسبة إما عن طريق الملتحمة من أعلى أو عن طريق الفم من أسفل . أما في المجموعة الثانية فقد تم توصيل غرفة الملتحمة السفلية بالردب الأنفي وقد ثبت من النتائج أن هذه الطريقة هي افضل وسيلة لتصريف الدموع المتجمعة عند الحمير حيث يتم الالتئام دون أي مضاعفات . وفي المجموعة الثالثة تم توصيل غرفة الملتحمة السفلية بالجيب الأنفي الفكي ، وهذه الطريقة قد تكون مصحوبة بالتهاب صديدي بالجيب الأنفي أثناء التأم القناة أو بعده وذلك نتيجة لتراكم الأجسام الغريبة داخل الجيب الأنفي .

SUMMARY

The present study was performed experimently on 18 appearantly healthy donkeys. These animals were classified into three equal groups. In each group, two techniques were performed one on each side of the head. The first group for performing conjunctivoralostomy, the second one

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for performing conjunctivorhinostomy through the diverticulum nasi and the third one for conjunctivorhinostomy via the maxillary sinus. The surgical anatomy of the area of the operation was studied on 10; heads of adult donkeys of both sexes. The obtained results revealed some variations on the different structures in these areas compared with those reported in other equine.

The surgical results indicate that the period for complete healing of the constructed tunnel in each technique was : 70-80 days and 100-110 days in the first group, 65-80 days and 50-60 days in the second one and, 75-90 and 60-70 in the last group for each technique respectively. The conjunctivorhinostomy via the diverticulum nasi by both techniques was technically easier and excellent for relief of epiphora in donkeys.

INTRODUCTION

The most and obvious characteristic symptom to the permanent obstruction of the nasolacrimal duct, whether congenital or acquired, was epiphora followed by severe dermatitis at the line of tear flow "Tear scald" (GELATT, 1981 and ISMAIL, 1987).

An alternate route can be constructed surgically to prevent epiphora and to drain the tears directly into the nasal cavity "Conjunctivorhinostomy" or into the oral cavity "Conjunctivoralostomy".

In conjunctivorhinostomy; a permanent fistula is constructed surgically which is eventually mucous membrane lined, to extend from the medioventral conjunctival fornix to the nasal cavity (LONG, 1975 and COVITZ; HUNZIKER & KOCH, 1977). While in conjunctivoralostomy, a subcutaneous tunnel is constructed to extend from the lower conjunctival fornix to the upper fornix of the lip (DICE, 1977).

The aim of the present study is to compare and evaluate the different techniques for conjunctivoralostomy and conjunctivorhinostomy and to choose the best technique to be applied in cases of permanent obstruction of the nasolacrimal duct.

MATERIAL and METHODS

The present study was first carried out on 10 heads of adult donkeys of both sexes and ages. The head were injected with 10% formaline solution through the common carotid artery. Careful dissection was performed to explore the surface and surgical anatomy of the face region. The nomenclature used in the present work was in accordance to N.A.V. (1982).

Keeping in mind the results of the previously mentioned dissection, six techniques were carried out experimentally on 18- adult apparently healthy donkeys. These animals were classified into three groups. Each group consists of 6- donkeys, where

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two techniques were performed one of them on the right side and the other on the left side. The first group for performing conjunctivoralostomy, the second one for performing conjunctivorhinostomy through the diverticulum nasi, and the third one also for conjunctivorhinostomy via the maxillary sinus.

The animal was anaesthetized using deep chloral hydrate narcosis (5 gm/ 50 Kg.BW. 10% solution) and prepared for surgery. The medial canthal area was scrubbed with soap and water. The conjunctival fornix was irrigated with boric acid 2% solution. The oral vestibule with special attention to the fornix of the maxillary lip was irrigated with sterile saline solution (In conjunctivoralostomy). The false nostril and diverticulum nasi were scrubbed with soap and warm water then disinfected by tincture iodine (In conjunctivorhinostomy). The sites of the surgical operations on the skin was clipped and scrubbed with soap and water, then disinfected with tincture iodine.

Necessary surgical instrumentation includes, scalpel, speculum, tenotomy scissors, bone trephine or manual drill, steinmann pins, Crocodile forceps, artery forceps, and tissue forceps were prepared and included.

A polyethylene tube (4-5 m.m. outside diameter) was constructed to fit in the fistula and to maintain its potency during healing. It was constructed to have a heat produced flange on its proximal end.

Conjunctivoralostomy :

The conjunctivoralostomy was performed in the first group by two techniques where a subcutaneous tunnel was constructed from the lower conjunctival fornix to the fornix of the maxillary lip.

In the first technique, a small skin incision (1/2 cm. in length) was performed directly above the level of the upper fornix in the maxillary lip. A crocodile forceps was introduced into the incision and pushed subcutaneously in the direction of the lower eyelid until it reaches the orbital rim. The skin over the end of the forceps using scalpel was punctured and then the forceps pushed until its jaws become clearly visible from the punctured wound (Fig. 1). The polyethylene tube was fixed to the jaws of the forceps and then grasped allowing the tube to pass subcutaneously until the lower skin incision. The proximal end of the tube was cut at the level of the upper skin incision and buried in the subcutaneous tissue. One stitch was applied over each incision for closure of the subcutaneous tunnel. The buried tube was left in place for 70-80 days until complete healing and patent subcutaneous tunnel was established. The mucous membrane at the upper fornix of the maxillary lip and at the level of the implanted polyethylene tube was opened. A small artery porceps was introduced from this opening and the distal end of the tube was fixed to their brongs. The tube was partially withdrawn from the opening and its distal end was cannulated with another polyethylene tube, after that the tube returned back in situe within the subcutaneous tunnel and fixed by the hand from outside. The conjunctival

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mucous membrane in the lower conjunctival sac at the level of the tube was opened and a small artery forceps was introduced from such opening catching the proximal end of the tube and grasped to the outside. The proximal end of the tube was flanged and fixed to the open conjunctiva by stitching, while the cannulated tube was cut 1/2 cm. distal to the upper fornix of the lip. Two weeks, were necessary to maintain potency of the conjunctival and the fornix of maxillary lip incisions, then the polyethylene tube was removed. Flushing of the subcutaneous tunnel from time to time by mild antiseptic solution was performed to maintain its patency.

The second technique of conjunctivoralostomy differ from the preceeding one in that the Crocodile forceps was introduced directly through the fornix of the maxillary lip and pushed subcutaneously in the direction of the lower conjunctival fornix (Fig. 2).

The tube was burried into the subcutaneous tunnel and its proximal end was flanged and fixed to the incised conjunctival fornix. The tube was left in position until complete healing of the subcutaneous tunnel was obtained (100-110 days).

Conjunctivorhinostomy :

The conjunctivorhinostomy was performed in the second and third groups, using two techniques.

In the second group, a subcutaneous tunnel was constructed to extend from the medioventral conjunctival fornix to the diverticulum nasi.

A long crocodile forceps was introduced at the roof of the caudal end of the diverticulum nasi, after grasping the tendon of *M. levator labii maxillaris* ventrally, and pushed in the direction of the medioventral conjunctival fornix (Fig. 3). As the forceps protruds through the conjunctiva, just rostral to the third eyelid and ventral to the lower punctum, a small incision was performed over it. The end of the polyethylene tube was fixed to the jaws of the forceps which was grasped allowing the tube to pass subcutaneously to the diverticulum nasi. The proximal flanged end of the tube was fixed to the conjunctiva while the other end was cut 1/2 cm. distal to the roof of the diverticulum nasi. The tube remained fixed in situ until complete formation of the subcutaneous tunnel took place (65-80 days).

A similar technique was performed on the other side of the animals head by burrying the polyethylene tube within the subcutaneous tunnel through two skin incisions one of them was made at the lower orbital rim and the other skin incision was performed just above the level of the roof of the caudal end of the diverticulum nasi (Fig. 4). Closure of the skin incisions, after fixation of the tube within the subcutaneous tunnel was performed and the tube remained in situ until complete healing of the tunnel (50-60 days). Then the subcutaneous tunnel was opened from both the conjunctival fornix and the diverticulum nasi as described previously in conjunctivoralostomy.

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In the third group, the subcutaneous tunnel was constructed to extend from the medioventral conjunctival fornix to the rostral maxillary sinus.

Two to three cm half circle skin incision was performed at the level of the rostral maxillary sinus. The skin was bluntly dissected and elevated upword, then the periostium covering the maxillary bone was incised. An opening was performed within the maxillary bone (equal in diameter to the polyethylene tube) using bone trephine or manual drill and steinmann pins. A small artery forceps was introduced into the skin incision and pushed subcutaneously in the direction of the ventromedial conjunctival fornix. As the end of the forceps protruds anterior to the third eyelid and ventral to the lower lacrimal punctum, a small conjunctival incision was performed. The end of the polyethylene tube was fixed to the brongs of the forceps which was grasped allowing the tube to pass subcutaneously. The lower end of the tube was fixed into the maxillary sinus through the constructed opening followed by closure of the skin incision. The upper flanged end of the tube was fixed at the conjunctival opening. About 75-90 days were necessary to fix the tube within the tunnel until the later becomes completely heald.

On the other side of the head in the animal of this group, an alternative technique was performed. The subcutaneous tunnel was established first with its connection with the maxillary sinus (Fig. 5). Then after 60-70 days, the conjunctiva at the level of the burried polyethylene tube was opened and the tube was grasped by forceps, flanged and fixed to the conjunctival opening for about another two weeks before its removal.

Post operative care include, topical application of cambison eye ointment four times daily with I.M. injection of neobiotic 2 vials daily for one week. The frequency of ointment was reduced to once or twice daily as long as the tube remains in situe. The stitches over skin incisions were removed 8-10 days postoperatively.

RESULTS

Anatomical studies :

The muscles, blood vessels and nerves at the area of the operations as well as the diverticulum nasi and maxillary sinus are described.

These muscles include cutaneous fascia, levator labii maxillaris, levator nasolabialis, caninus, and buccinator.

M. cutaneous fascia :

The muscle (6/7) is devoid at the nasal, maxillary and infraorbital regions and develops at the cheek region.

M. levator labii maxillaris :

The muscle (6/3, 7/4, 8/9) originates from the maxilla about 2 cm. rostral

to the orbital rim and passes dorsorostrally to insert with its fellow at the maxillary lip. The tendon of insertion begins at the caudal end of the diverticulum nasi and has a synovial sheath which lies on the dorsal portion of the lateral aspect of the diverticulum. It can be detected in the living animals and drowns ventrally in the conjunctivorhinostomy.

M. levator nasolabialis :

The muscle (6/4, 7/3, 8/10) covers the belly of the previous muscle and divides into two portions between which the M. caninus passes. It originates from the frontal and nasal bones and inserts into the lateral wing of the nose and oral commissure.

M. caninus

The caninus muscle (6/5, 7/5, 8/11) arises from the maxilla at about 3 cm. rostral to the facial crest and spreads out in the lateral wing of the nostril.

M. buccinator :

The buccinator muscle (6, 7/7) is thick and is situated in the cheek region. It arises from the lateral aspect of the maxilla and the alveolar border of the mandible. It inserts into the angle of the mouth.

M. malaris :

The malar muscle (6/8, 7/10) extends from the fascia of the infraorbital region to the lower eyelid.

M. orbicularis oculi :

The muscle attaches with the lacrimal bone and palpebral ligament at the medial canthus of the eye. It is thinner in the lower eyelid.

The blood vessels in the face region comprise the facial artery and vein as well as their main branches.

A. facialis :

The facial artery (6/11, 7/13) ascends along the rostral border of M. masseter being covered by M. cutaneous faciei and zygomaticus. It lines superficially in the maxillary region and continues its course to divide into A. nasalis dorsalis and A. angularis oculi at the muscular belly of M. levator labii maxillaris. The main branches of the facial artery are the inferior, superior labial and lateral nasal. From the clinical point of view, the superior labial artery (7/15) arises at about 3 cm. rostral to the facial crest and runs subcutaneously in the maxillary region along the ventral border of M. caninus for about 3.5 cm. The lateral nasal artery (7/16) is weakly developed and springs at about 2 cm. rostradorsal to the facial crest. It pursues for approximately

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1.5 cm, under the skin, along the dorsal border of *M. caninus*. It gives off a small twig that extends dorsad on the lateral wall of the caudal compartment of the diverticulum nasi.

The dorsal nasal artery (7/17) springs at a level 4 cm. dorsal to the rostral end of the facial crest. It runs deep to *M. levator nasolabialis*. The angular artery of the eye passes caudodorsally subcutaneously in the infraorbital region.

V. facialis :

The arrangement and courses of the branches of the facial vein are similar to the corresponding artery except the course of the V. dorsalis nasi (7/22) and V. angularis oculi (2/23) subcutaneously on the *M. levator nasolabialis*.

The superficial nerves associated with the area of the operation are the R. buccalis dorsalis of the N. facialis and the external nasal branch of N. infraorbitalis.

R. buccalis dorsalis :

The dorsal buccal branch of the facial nerve (6/14, 7/25) runs rostrally on *M. masseter*, dips under *M. zygomaticus* and reaches the ventral border of *M. caninus* where it continues ventral to the superior labial artery. Just before reaching the ventral border of the *M. zygomaticus*, it detaches a considerable branch that runs rostral ventral to the lateral nasal artery.

R. externus nasi :

The external nasal branch (6/16, 7/27) arises from the infraorbital nerve and courses rostradorsally along the ventral border of the tendon of insertion of *M. levator labii maxillaris*.

Diverticulum nasi :

The nostril is bounded by a medial and lateral wing the lateral one is concave enclosing muscle and fibrous tissue. The medial wing is convex dorsally, concave ventrally and supported by the alar cartilage. The lamina of the latter, presents a prominence in the dorsal part of the medial wing from which the alar fold extends caudally. The alar fold (8/5) partially divides the nostril medially into a dorsal and ventral portions. The former is the false nostril (8/1) lead to the diverticulum nasi while the other is the true nostril (8/2) leads to the nasal cavity. The diverticulum nasi (6,7,2) measures 9-12 cm. in length and extends about 3 cm. caudal to the nasoincisive notch. The interior is lined by fine pigmented skin devoid of hairs. Two cutaneous folds extend laterally from the medial wall of the diverticulum dividing it into three compartments the rostral fold (8/3) is oblique runs rostroventrally to join the alar fold, and lies at the middle of the diverticulum. The caudal fold (8/4) is parallel

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to the rostral one and places on the nasal process of the incisive bone. The lateral wall of the rostral compartement is firmly attached to the skin while the others are related to the tendon of M. levator nasolabialis and the skin laterally. The caudal end of the diverticulum nasi (8/8) locates on the maxilla between the above named tendon and levator nasolabialis. The distance between the medial canthus of the eye and the caudal end of diverticulum is about 13 cm.

Maxillary sinus :

The maxillary sinus extends cauded to the root of the zygomatic process and its rostral limit is indicted approximately by a line drawn from the rostral end of the facial crest to the infraorbital foramen. It is dorsal limit corresponds to a line drawn caudally from the infraorbital foramen parallel to the facial crest. It is divided into a rostral and caudal maxillary sinus by oblique septum parallel to the rostral limit and lies at about 4 cm. caudal to the rostral end of the facial crest. The maxillary sinus communicates with the frontal, sphenopalatine and middle conchal sinuses and the middle nasal meatus.

The proper site of the conjunctivorhinostomy via the rostral maxillary sinus is at about 4 cm. dorsal to the orbit and 3 cm. dorsal to the facial crest.

SURGICAL STUDIES :**Conjunctivoralstomy :**

In the first technique, the polyethylene tube burried within subcutaneous tunnel via two skin incisions. Healing demand 70-80 days before opening the mucous membrane of the conjunctiva and the fornix of maxillary lip. Two weeks necessary to maintain patency of the incised openings of the mucous membranes.

In the second technique, complete healing of the subcutaneous tunnel was obtained after 90-110 days. Infection was recorded in two cases manifested by suppuration of the tunnel accompanied by excoriation and ulceration of the skin along its course specially its middle third. Ruptur of the stitches which fixe the flanged end of the tube to the incised conjunctival fornix followed by displacement of the tube, striking and irritating the cornea, was recorded in two cases.

Conjunctivorhinostomy :

In the second group the subcutaneous tunnel was constructed to extend directly from the medioventral conjunctival fornix to the diverticulum nasi. Complete healing of the constructed tunnel in all animals used in such technique was obtained after 65-80 days without any complication.

In the second technique of the same group, the tube was burried within the tunnel through two skin incisions. Complete healing took place after 50-60 days without

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any complications. Communications of the tunnel to the conjunctival fornix and diverticulum nasi demanded about two weeks to maintain potency of the incised openings before removal of implanted tube.

In the third group, the subcutaneous tunnel was constructed to extend directly from the conjunctival fornix to the rostral maxillary sinus. About 75-90 days were necessary for fixation of the tube within the tunnel until complete healing. Infection of the tunnel and empyema of the paranasal sinuses was recorded in three cases during the healing period. Moreover, empyema was detected in two cases after complete healing of the subcutaneous tunnel.

In the second technique of the same group, the tube was grasped within the subcutaneous tunnel through a small skin incision at the level of the orbital rim. About 60-70 days were necessary for complete healing of the subcutaneous tunnel before its connection with the conjunctival fornix. Fixation of the flanged end of the tube to the conjunctival opening needed two weeks to maintain its potency. Over the long run (3- month later) empyema of the paranasal sinuses was observed in two cases.

DISCUSSION

The obtained results revealed that the burying of the polyethylene tube in conjunctivoralostomy from the lower conjunctival fornix to the upper fornix of the maxillary lip was dangerous where the tube passed over the facial vessels, R. buccalis dorsalis and the active muscles. On the other hand, the burying of such tube in conjunctivorhinostomy from the ventromedial conjunctival fornix to the caudal end of the diverticulum nasi was safe where the tube lied subcutaneously without complex relation with main blood vessels and nerves. However, the drainage of the tears into the maxillary sinus was unsatisfactory because of its direct communication with the other paranasal sinus. From the anatomical point of view, the topography of the area of the operations in the donkey was compared with that reported in the other equines.

The origins and insertions of the Mm. levator labii maxillaris, levator nasolabialis, caninus, buccinator malaris and orbicularis oculi were similar to that described in the horse by SISSON (1975).

The course and distribution of the facial artery and veins in the present work were in accordance with WILKENS (1981) in horse and ATTIA (1982) in mule. However, the superior labial artery was given off at about 3-5 cm. rostral to the facial crest in the donkey. ABD EL-MOATY (1980) in the same animal estimated that level to be 1-2 cm. The lateral nasal artery was detached at about 2 cm. rostradorsal to the facial crest, ABD EL-MOATY (1980) in the donkey recorded that level to be 5 cm.

The R. buccalis dorsalis of the facial nerve in the donkey was in agreement with that of horse (DELLMAN and McCLURE, 1975). The Rr. nasales externi of the infraorbital nerve presented by a considerable branch coursed on the lateral aspect of the diverticulum nasi, DELLMAN and McCLURE (1975) in horse stated that these branches are 2-3 in number and ramify in the nasal region.

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The false nostril was located dorsal to the alar fold and conveyed into the diverticulum nasi, similar fact was traced in horse by NICKEL *et al.* (1979). The diverticulum nasi measured 9-12 cm. in length in the donkey, BRADLEY and GRAHAME (1947) and EL-HAGRI (1967) in the horse recorded that length 5-6 cm.

The medial wall of the diverticulum nasi presented by two folds dividing it into three compartments, a result which was not reported among other equines.

The external limits of the maxillary sinus in the donkey were in a line with these recorded in horse (DYCE *et al.*, 1984).

In the present study both conjunctivorhinostomy and conjunctivorhinostomy through the diverticulum nasi or the rostral maxillary sinus were performed by two techniques in each group. The former was performed in the first group while the latter in the second and third ones.

In the first technique, the polyethylene tube was buried within a closed s.c. tunnel in the beginning. The object of such technique is to guard against descending infection from the conjunctival sac or ascending infection from both the oral cavity in conjunctivorhinostomy and the diverticulum nasi in conjunctivorhinostomy. This technique decreases the healing period of the s.c. tunnel.

The infection was recorded in the other technique where the s.c. tunnel was connected directly to the conjunctival fornix and to the oral cavity or diverticulum nasi.

In conjunctivorhinostomy, the continuous movement of muscle, during mastication was reflected on the polyethylene tube within the s.c. tunnel creating a pressure over the fixation suture. The suture material was separated from the conjunctiva followed by displacement of the tube, striking and irritating the cornea.

The results of conjunctivorhinostomy via the rostral maxillary sinus was not satisfactory where the infection to the s.c. tunnel and empyema of the paranasal sinuses were the most serious complications of this technique. The prognosis was bad over the long run. The tunnel was obstructed by any foreign body, tear floater or mucoid discharges which were difficult to be corrected as the flushing of the s.c. tunnel in this technique was difficult. These obstructive materials were passed into the sinus causing sinusitis and empyema, in contrast LONG (1975) stated that the success of this method is about 85-90%.

The conjunctivorhinostomy through the diverticulum nasi was technically easier and excellent for the relief of epiphora in donkeys. Complete healing of the constructed s.c. tunnel in this technique was obtained without any complication, a fact which let us consider that this technique was more better than all previously described techniques.

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At least a period of two weeks was needed before application of this technique on clinically affected animals. In this period patching of the eye for prevention of epiphora and dressing of ulcerated and excoriated skin was performed until its complete healing.

LONG (1975) and COVITZ *et al.* (1977) performed conjunctivrhinostomy in dogs through the nasal cavity by trephining the maxillary sinus. They added that the possible complication includes tube displacement and loss, closure of the fistula, and mucous membrane overgrowth.

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LEGENDS

Fig. (1): Conjunctivoralostomy, the crocodile forceps pushed S.C. via two skin incisions, the proximal one at the orbit rim and the other above the level of the fornix of the maxillary lip.

Fig. (2): Conjunctivoralostomy, the crocodile forceps was introduced directly to the upper fornix of the maxillary lip and pushed subcutaneously in the direction of the lower conjunctival fornix.

Fig. (3): Conjunctivorhinostomy, the crocodile forceps was pushed directly from the roof of the caudal end of the diverticulum nasi in the direction of the ventromedial conjunctival fornix.

Fig. (4): Conjunctivorhinostomy, the crocodile forceps pushed S.C. via the two skin incisions, the proximal at the orbital rim and the distal just above the level of the caudal end of the diverticulum nasi.

Fig. (5): Conjunctivorhinostomy through the maxillary sinus. Notice the two skin incisions, the proximal one at the orbit rim while the other one over the area of the rostral maxillary sinus where it was opened.

Fig. (6): Superficial dissection of the left face region of the donkey.

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| A- Nostril | B- Facial crest. |
| 1- M. cutaneous fascia. | 2- Caudal end of diverticulum nasi. |
| 3- M. levator labii maxillaris. | 4- M. levator nasolabialis. |
| 5- M. caninus. | 6- M. zygomaticus. |
| 7- M. buccinator. | 8- M. malaris |
| 9- Third eyelid. | 10- Lacrimal caruncle. |
| 11- A. facialis. | 12- V. facialis. |
| 13- Parotid duct. | 14- R. buccalis dorsalis of N. facialis. |
| 15- Ventral buccalis branch of N. facialis. | |
| 16- External nasal branch of N. infraorbitalis. | |

Fig. (7): Superficial dissection of the face region of the donkey.

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|-------------------------------------|---------------------------------|
| 1- Nostril. | 2- Diverticulum nasi. |
| 3- M. levator nasolabialis. | 4- M. levator labii maxillaris. |
| 5- M. caninus. | 6- M. zygomaticus. |
| 7- M. buccinator. | 8- Orbicularis oris. |
| 9- M. depressor labii mandibularis. | 10- M. malaris. |
| 11- Third eyelid. | 12- Lacrimal caruncle. |
| 13- A. facialis. | 14- A. labii inferior. |
| 15- A. labii superior | 16- A. lateralis nasi. |
| 17- A. dorsalis nasi. | 18- V. facialis. |
| 19- V. labii inferior. | 20- V. labii superior. |
| 21- V. lateralis nasi. | 22- V. dorsalis nasi. |
| 23- V. angularis oculi. | 24- Parotid duct. |

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- 25- Dorsal buccal branch of N. facialis.
- 26- Ventral buccal branch of N. Facialis.
- 27- External nasal branch of N. infraorbitalis.

Fig. (8): Superficial dissection of the left lateral nasal region of the donkey.

- 1- False nostril.
- 2- True nostril.
- 3- Rostral fold of the diverticulum nasi.
- 4- Caudal fold of the diverticulum nasi.
- 5- Alar fold.
- 6,7,8- Rostral, middle and caudal compartement of the diverticulum nasi.
- 9- M. levator labii maxillaris.
- 10- M. levator nasolabialis.
- 11- M. caninus.



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