

STUDY OF TRACHEAL ALLOGRAFT TRANSPLANTATION IN ADULTS DOGS

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(Received 31 August 2009, Accepted, 15 November 2009)

Keywords; healing, dog, coughing.

ABSTRACT

The present study was done to investigate the ability of tracheal allograft transplantation in adult dogs and evaluate the health condition of the outcome of the allograft transplantation respect of the healing. Two groups of adult dogs (each group 4 dogs) were used as both donors and recipients.

A rectangle tracheal allograft was transplanted in recipient dog and fixed by suturing, gross evaluation showed that there are no signs of tracheal stenosis or any complication like difficult breathing and blood stained coughing, the animals remained in good health throughout the procedure.

Histopathological examination one month after transplantation revealed prominent cartilage enclosed by fibrosis and absence of any infiltration of inflammatory cells while histopathological finding 2 months after operation showed sub epithelial fibrosis and presence of cartilage. This will give indication that tracheal allograft can be used as tissue replacement for treatment of tracheal defects.

INTRODUCTION

Although tracheal neoplasm and trauma are rare, the use of tracheal graft when such patient requires long segmental replacement of more than 6 cm with this aim, tracheal allograft have been tested in animal models as the most feasible approach pathologic process involving the trachea and carina pose major difficulties for chest physician (1).

Although techniques have been developed enabling primary resection and reconstruction, extensive tracheal resection remain challenging and may non respectable by stinting and radiation (2).

Tracheoplasty is the best therapeutic option for obstructive tracheal diseases up 6 cm in length (3).

In this present study we tried tracheal reconstruction with allotransplantation of fresh rectangle tracheal graft in dogs, the procedure involving inserting a rectangle graft in a rectangle gap that made in the trachea of recipient dog and suturing by using 3-0 silk.

We evaluate the healing process of the tracheal graft and evaluate the health condition of the animal postoperatively. The success of the outcome of allograft transplantation can be very important step in surgical treatment of tracheal tumors and trauma in human.

MATERIAL AND METHODS

six adults dogs were used as both donors and recipients. All dogs were maintained according to the national society at medical research principles of laboratory animal care. Donor dogs and recipient dogs are of the same weight about (10-15) kg respectively. The dogs were anaesthized by giving ketamine (15) mg/kg body weight mixed with xylazine (5) mg/kg body weight were given intramuscularly (4).

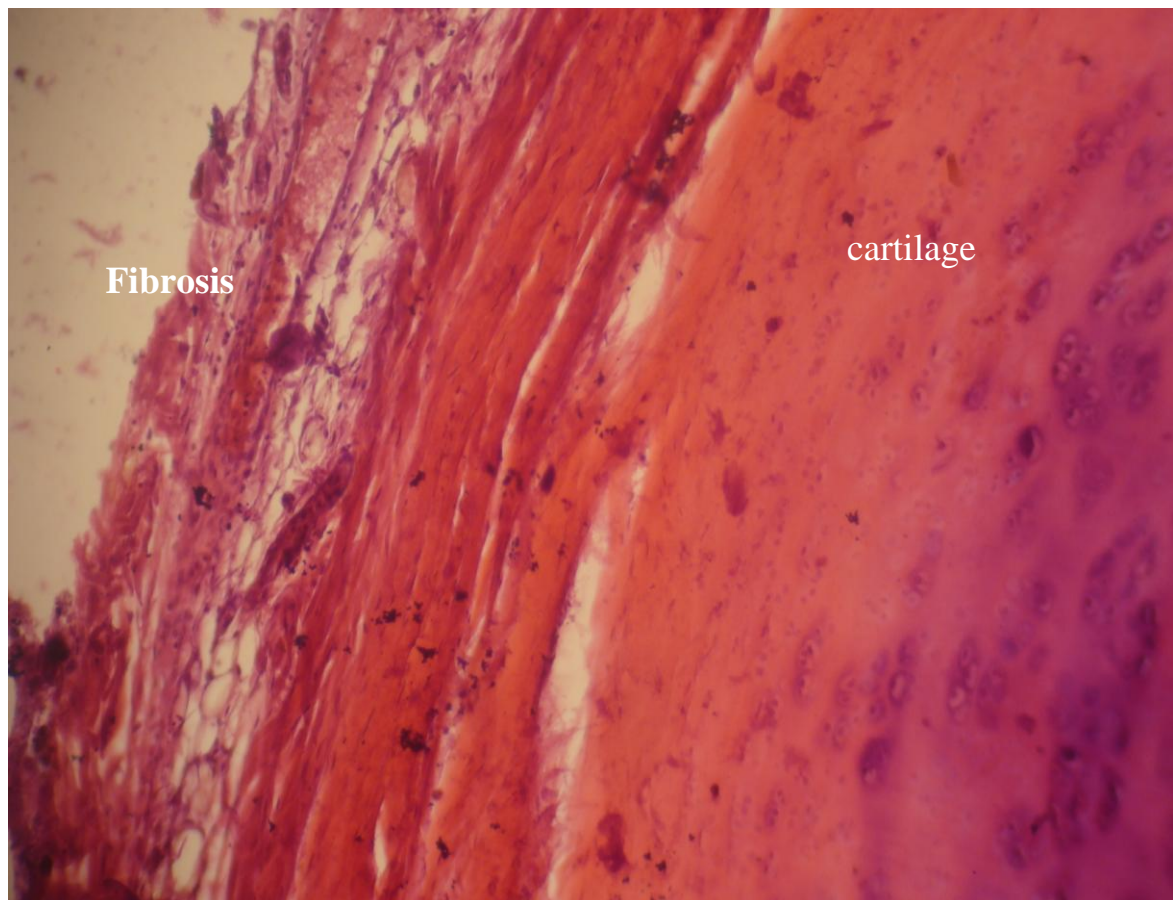
The site of operation was prepared surgically (clipped, shaved and disinfected). An incision about 2 inches long is made through the skin and sub cutis on the mide ventral line of the neck, the pairs sternohyoidus and sternocephalicus muscles are separated with retractors. An incision is made between the tracheal rings (annular ligament),three tracheal rings(rectangular in shape) were removed from donor dog to recipient dogs and were transplanted and sutured by simple interrupted suturing using 3-0 silk suture, the muscles and skin were sutured in usual manners, the donors and recipients dogs were given antibiotic for 3-4 days post operatively. When the dogs were killed (euthanized)30 days post operatively and 60 days post operatively, the transplanted tracheal allograft were removed and fixed in formalin 10%, then impeded in paraffin wax, sections were cut at 5 microns and stained with hematoxylin and eosin stains for Histopathological examination

RESULTS

Gross examination of all dogs (donors and recipients) showed no adverse reaction of any graft rejection to the allograft procedure with no difficult breathing or blood stained cough and there is no signs of tracheal stenosis and the animals stayed in good health condition through out the procedure.

Histopathological examination 30 days post operatively revealed presence of prominent cartilage enclosed by fibrosis, absence of any infiltration of inflammatory cells, presence of sub mucosal edema, prominent cartilage enclosed by minimal to moderate fibrous capsule figure (1, 2, and 3).

60 days post operatively the Histopathological section showed the tracheal epithelial lining with hypertrophy and minimal proliferation of sub epithelial fibrosis, prominent sub mucosal gland, sub mucosal fibrosis and presence of cartilage figure (4, 5, and 6).



Fig(1): prominent cartilage enclosed by fibers, presence of sub mucosal edema (one month).(X100 H&E stain)

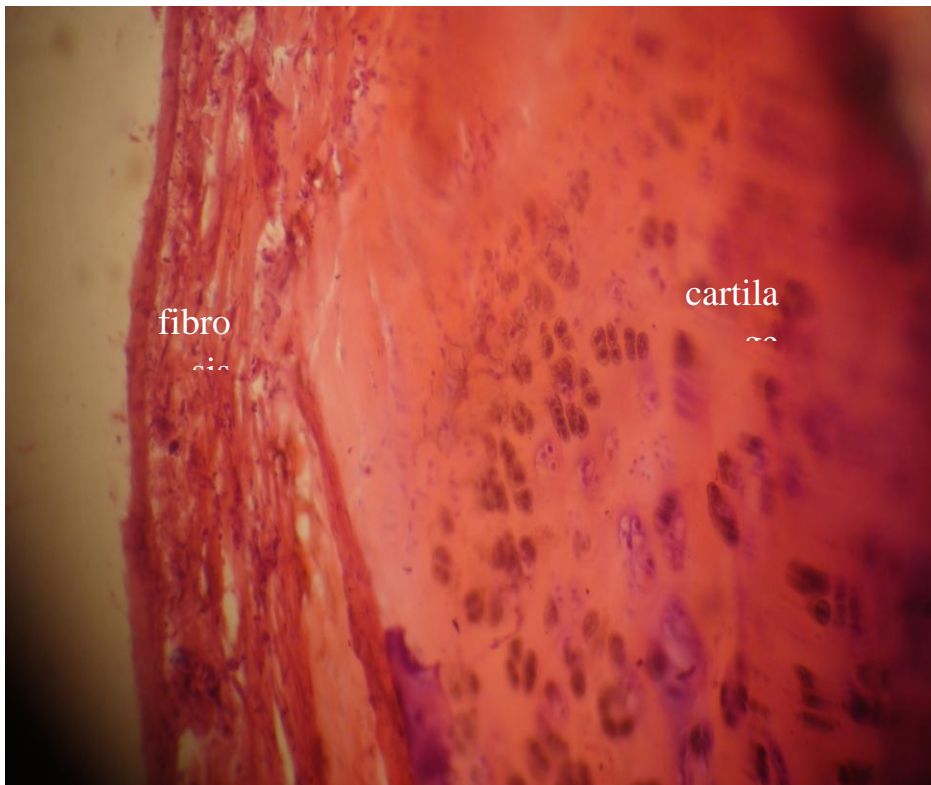


Fig (2): prominent cartilage enclosed by minimal to moderate fibrous capsule (one month). (X100 H&E stain)

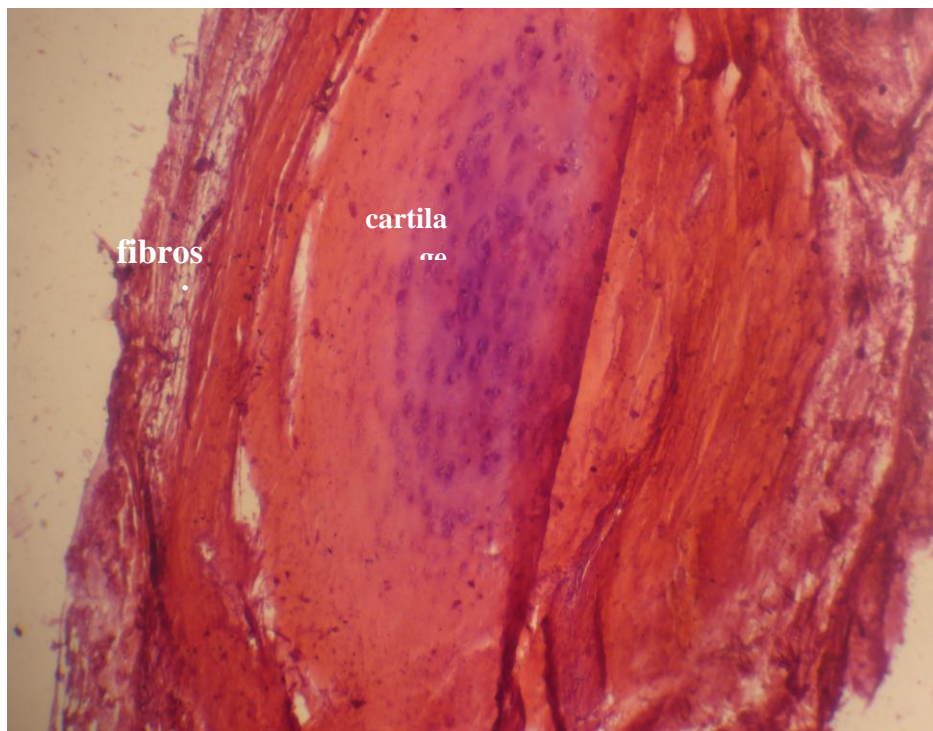


Fig (3): prominent cartilage enclosed by fibers, absence of any infiltration of inflammatory cells. (X100 H&E stain)

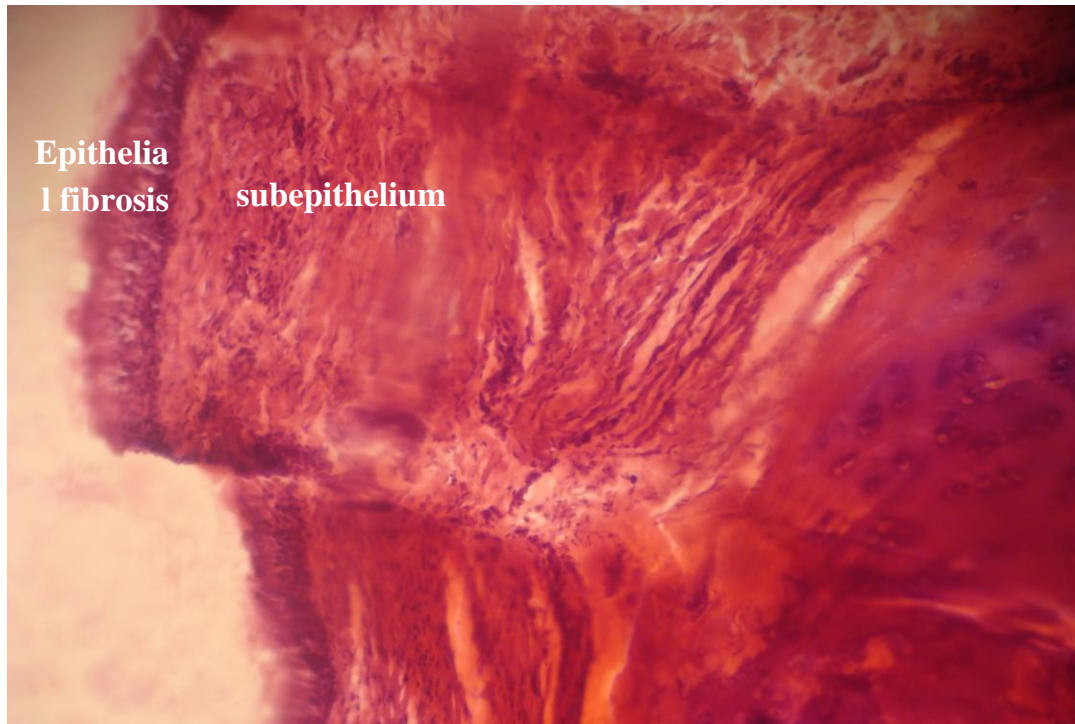
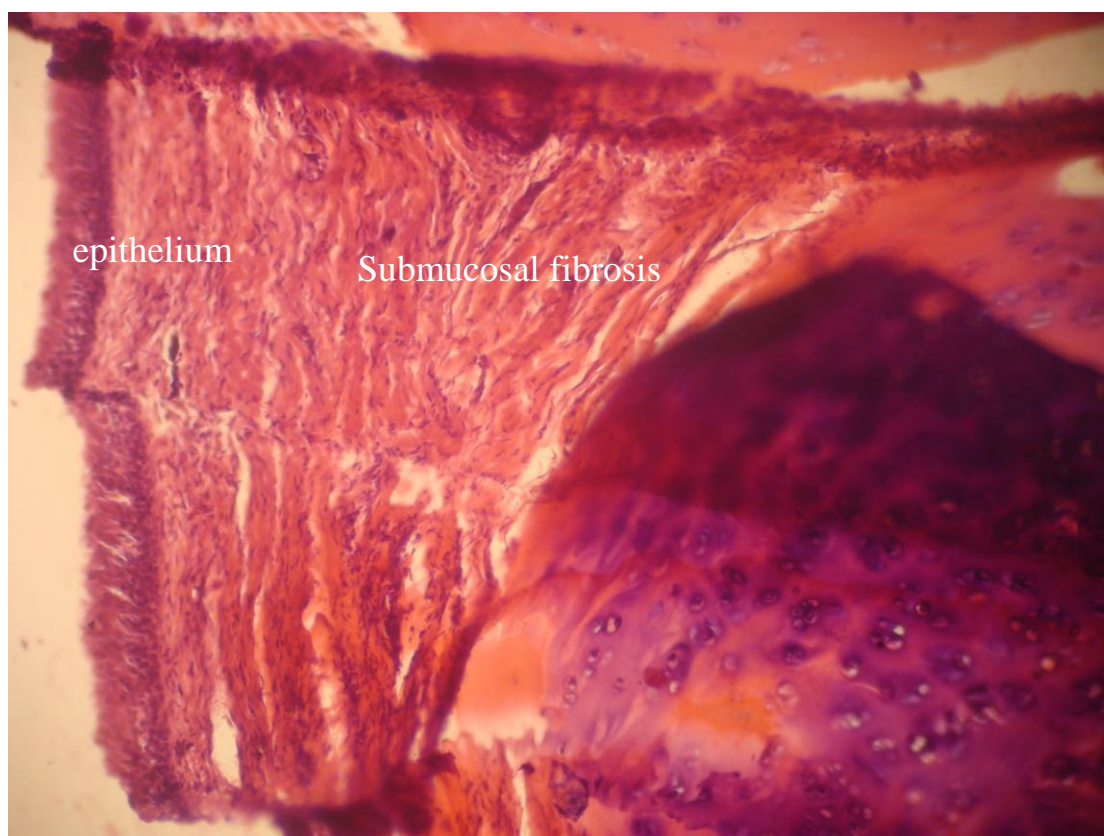


Fig (4): Histopathological section showing the tracheal epithelial lining and sub epithelial fibrous (two months). (X100 H&E stain)



Fig(5): tracheal epithelial with hypertrophy and minimal proliferation, sub epithelial fibrous, prominent sub mucosal gland, presence of cartilage (two months). (X100 H&E stain)



Fig(6): tracheal epithelium with hypertrophy, sub mucosal fibrous and prominent cartilage
(X100 H&E stain)

DISCUSSION

In the present study fresh tracheal allograft was prepared by fresh rectangle tracheal graft and transplanted from donor dog to recipient dog suddenly.

The healing of tracheal allograft was progressively steadily and suitable complete healing was established. The clinical signs of treated dogs (donor and recipient dogs) showed that there is no sign of tracheal stenosis or respiratory problems like coughing difficult breathing tracheomalacia and the animal remain in healthy condition, these results come in agreement with other studies (5); (6); (7) and (8)who report that there is no respiratory problems and tracheal stenosis or tracheomalacia and there is no immunosuppression(1-2)after transplantation. Other study(9) reveled no ischemic change neither stenosis nor shrinkage were recognized seven days and twelve weeks after transplantation.

Thirty days postoperatively, histopathological observation showed prominent cartilage enclosed by fibrosis and absence of infiltration of any inflammatory cells these

results agree with other study (10) who report healing of bronchial anastomotic was excellent 10-11 months post operatively. Sixty days after transplantation the histopathological findings revealed minimal proliferation of sub epithelial fibrosis, presence of sub mucosal fibrosis and presence of cartilage, these results come agree with other studies (11) and (12) who report defective epithelium , cellular cartilage with fibrosis and healing of bronchial anastomosis was excellent (6 week 11 month) after transplantation.

CONCLUSION

The tracheal allograft is excellent method for treatment of tracheal defect and there is no immune suppression against tracheal allograft transplantation.

دراسة زراعة طعم مباين من القصبة الهوائية في الكلاب البالغة

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الخلاصة

أجريت هذه الدراسة لمعرفة إمكانية زراعة طعم مباين من القصبة الهوائية في الكلاب البالغة و تقييم الحالة الصحية خلال فترة الشفاء بعد زراعة الطعم. استخدمت مجموعتين من الكلاب البالغة (كل مجموعة 4 كلاب) في هذا البحث كواهب و مستقبل في آن واحد.

طعم مباين مستطيل من القصبة الهوائية زرع في الكلب المستقبل و ثبت بواسطة الخياطة. الفحص العياني للكلاب اظهر عدم وجود علامات تضيق القصبة الهوائية و كذلك عدم وجود أي مضاعفات تنفسية مثل صعوبة التنفس و السعال المصحوب بالدم و بقيت الحيوانات بصحة جيدة بعد العملية.

أثبتت نتائج الفحص النسيجي المرضي بعد شهر من زراعة طعم القصبة الهوائية وجود غضروف بدائي محاط بتليف و اختفاء ارتشاح الخلايا الالتهابية بينما اظهر الفحص النسيجي المرضي بعد مرور شهرين من إجراء عملية الزرع تليف الطبقة تحت الظهارية ووجود غضروف. يعطي هذا دليل على إمكانية استعمال طعم القصبة الهوائية المباين كبديل في علاج أي ضرر بصيب القبة الهوائية

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