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## Results of Experiments on Replacement of Superior Vena Cava

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### A. Material and Method

Twenty six dogs of both sex were subjects of these experiments. After anesthetising with Nembutal, one grain per lb. body weight, the right hemithorax was opened and superior Vena Cava was exposed. Two internal thoracic veins and one posterior branch were ligated. A piece of vein, one to two inches long, was resected. The replacement was made either with vein itself or with a piece of Edward Tape Nylon or operation. In seven dogs an A. V. shunt was produced in neck between right carotid artery and right Jugular vein in two others anticoagulants were used.

### Varieties and Results.

#### I- Autogenous vein graft.

In seven dogs, autogenous vein graft was used i. e. the vein was resutured. In five directly between distal and proximal end and in other two between distal end right auricle.

Both dogs of second group died within twenty four hours after operation with clotted graft.

Three of the five dogs which had graft between both ends of cava died. One with tension pneumothorax and the other from bleeding. The third dog found dead in her cage on the fifth post operative day, with no cause of death detectable in autopsy. In all these three, the grafts were patent.

Of the remaining two, who survived operation, angiogram showed that only one had patent graft, this dog was sacrificed after five months, the graft was patent with a good epithelial lining. A marked stricture was detected in lower end.

The other dog who survived with a thrombotic graft was also sacrificed five months postop. Autopsy confirmed that the graft is clotted and only a good collateral circulation brings back the blood from head and arms.

### «II. Homologus Artery Graft.»

Only one dog had this type of operation. The artery was removed immediately post mortem from a dog and was kept in deep freeze refrigerator for seven days until the result of bacteriological culture could be obtained. Before use, the graft was reconstituted in 37°C normal saline. This dog died within 24 hours postop.

In autopsy, the graft was found to be clotted.

### «III. Edward Tape Nylon Graft.»

Eight dogs had this type of replacement. The graft was sterilized in autoclave and was preclotted before use.

One of these eight died on the table due to the technical difficulty in anastomosing the top end. Four others died within 24 hours with thrombosis of graft. From the remaining three, two died within a month, in both, the graft was patent. One of these died with empyema and the other with lung infarction.

The last of this series who survived, was sacrificed four months after operation. The graft found to be patent with excellent epithelial lining.

### «IV- Edward Tape Nylon Graft A. V. Fistula Neck.»

Seven dogs had an A. V. fistula in neck between right carotid artery and right jugular vein in addition to the replacement of S. V. C. with Edward Tape Nylon. Another dog had only an A. V. fistula in neck, without any graft on S. V. C. This survived three months post operatively and then was sacrificed. The fistula seemed causing no cardiovascular trouble for the animal ECG proof required «The A. V. anastomosis was end to end».

From the seven who had A. V. fistula in neck, either end to end or side to side, plus S. V. C. replacement, one died within 24 hours post operatively with a clotted graft, clotted shunt and dilated right atrium (difficult to explain why). Another died three days post op. with dilatation of right atrium and congestion of lungs. In this one the graft was patent.

Two others died respectively on 19th and 24th post operative days. In both of them, the graft was patent and death was caused by right heart failure.

The remaining three survived operation and were sacrificed after three months. The graft was patent in all of them, The A. V. fistula in two.

### «A- EDWARD tape Nylon Graft with Anticoagulants.»

Two dogs had anticoagulation with replacement of their S. V. C. with Edward Tape Nylon Graft.

The first one's prothrombin was put on dicoumarol for two days (5 mgr per kg body weight). Just before surgery the prothrombin was checked again (23.6%). The operation was done in usual way and a dose of dicoumarol (2.5 mgr per kg body weight), was given post-op.

In the other, the prothrombin was measured only before surgery (79%). After anastomosis was done, a dose of I. V. Heparine was given (1 mgr per kg body weight). A dose of Heparine depot (6 mgr per kg body weight) was given after the chest was closed.

These two dogs both died within 24 hours with bleeding in the chest.

### C. Discussion

In these 26 dogs, the best results have been obtained with autogenous vein graft, used directly between two ends of these S. V. C. (a patient out of 5). However, as two of these four have died within 24 hours due to technical causes, this result is not reliable. In any case, this series was only to check other series as the technique can not be applied in human.

Homologus artery had given good results in other centers but in these experiments the only one which was done, was not successful.

Synthetic material alone had very poor results as four out of seven «the one which died on table is not included died within 24 hours and in a fifth one, although the death occurred later, and the cause was lung infarction «patent graft» most probably it was due to a thrombus from suture lines.

Arterio venous fistula eliminates the immediate post operative clotting danger, and gives the animal time to epithelialize the graft. However, four, out of eight who had A. V. shunt in neck (seven with and one without graft on S. V. C.) died with right heart failure. To eliminate or at least decrease this risk, it may be advisable to close the shunt during this period. shunt after two weeks. As probably the graft will epithelialize during this. This procedure has not been done in present series and may be a good subject for next step in these experiments.

Using anticoagulants, although in present series has been done only in two, seems to be too dangerous to be carried on. If the animal is anticoagulated enough to prevent clotting in graft, suture lines will probably bleed as the blood flow is very slow in S. V. C. and can not be compared with arteries.

**SUMMARY**

Replacement of Superior Vena Cava was experimented in 26 dogs with autogeneous venous graft, homologus artery graft, Edward Tape nylon graft, Edward Tape nylon graft with arterio venous fistula and Edward Tape nylon graft with anticoagulants.

The results are discussed in detail and problems of venous grafts which are mainly due to the slow blood flow and blood clotting in grafts, are explained.

Arterio venous fistula between right carotid artery and right jugular vein eliminate danger of blood clotting but has the danger of right heart failur.

Using anticoagulants has been done in only two cases and this is not draw a conclusion. However, it seems that this would be rather dangerous because of slow blood flow in superior vena cava and the risk of bleeding.

**RESUME**

Expérimentation chez 26 chiens du remplacement de la veine cave supérieure, soit par un greffon veineux autogène, soit par un greffon artériel homologue, soit par un greffon en nylon "Edward TAPE": Greffon en nylon "Edward TAPE" avec création d'une communication artificielle artério-veineuse et greffon en nylon "Edward TAPE" avec utilisation d'anti-coagulants.

Les résultats sont discutés en détail et explipués dans le texte ainsi que le problème des greffons veineux qui sont essentiellement dus à la lente circulaton sanguine dans ler veine et la formation de caillots dans le greffon

La communication artério-veineuse entre l'artere caro tide cloir l'arotite et la veine jugulaire droite écarte le danger immédiat de formation de caillots mais, ilya un danger de défaillance cardite.

L'utilisation d'anti-coagulants dans cette étude n'a été faite que dans deux cas et ceci n'ast pas suffisant pour en tirer des conclation du sang dans la veine cave supérieure et avec des risques d'hémorragies,

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