Vascularised Homograft Transplantation of the Oviduct in the Pig

A CASE REPORT

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SUMMARY

Severely damaged Fallopian tubes remain an important cause of human infertility with a virtually hopeless prognosis. While other techniques have been attempted, vascularised homograft transplantation of the Fallopian tube has not yet been reported.

The purpose of this article is to record a case where such an operation was performed on a pig that had not been immunosuppressed. The organ removed 134 days later was totally viable with no obvious evidence of rejection.

While the immunological mechanisms of the pig and the human are not comparable, it is suggested that such an operation is technically feasible and may yet become a means of overcoming what is at present an insurmountable gynaecological problem.


Human infertility remains a common problem, affecting as many as 17% of married women. Lesions of the Fallopian tube are present in at least 40 - 50% of cases, and where obvious destruction of the whole structure is noted, this is irreparable, as conservative surgery is of little value.

Efforts to replace the Fallopian tube have included autotransplantation of the appendix, saphenous vein, a loop of ileum, peritoneal tunnels, and even the use of a plastic prosthesis. Some have attempted to bypass the Fallopian tube by placing the ovary directly into the uterine cavity. The above techniques have not met with success because they have concentrated on the anatomical deficits and appear to have ignored the complex physiological functions of the oviduct. Attempting to simulate the highly intricate and subtle function of the Fallopian tube, other workers have attempted extracorporeal insemination of ova with spermatozoa with a view to implantation of the developing zygotes into the uterus. To date it has not been possible to perform all the functions of the Fallopian tube in this manner, and there have been no viable pregnancies recorded.

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The outstanding possibility is that a healthy viable Fallopian tube may be the best form of replacement for its severely damaged or destroyed counterpart.

With this in mind a technique for vascularised transplantation of the Fallopian tube in the pig has been developed in our laboratory. The purpose of this article is to report the first case where the Fallopian tube had been successfully transplanted and was completely viable when removed 134 days later.

MATERIAL AND METHODS

Pigs of the Landrace X large white variety were used.

Operation

Anaesthesia was induced with thiopentone sodium and maintained with N₂O and O₂. Muscular relaxation was achieved with diallyl-nortoxiferine which was reversed with atropine and neostigmine on completion of the procedure which took 5½ hours. The right oviduct with a piece of distal cornu was dissected free of the broad ligament, together with a suitable artery and vein. All other vessels communicating with the structure were defined, clamped, ligated and transected.

The oviduct which was kept in a cooled dish containing triamcinolone acetate (Lederco) was perfused with a solution of plasmalyte B combined with 10 000 units of heparin and glucose 50 g/litre cooled to 10°C.

Once the recipient had been adequately prepared, anastomosis of the vein and artery were performed, using 6-0 and 7-0 silk sutures respectively. The cornu was then joined and sutured in place with 7-0 silk sutures, the fimbriae were tacked onto the recipient ovary, and the abdomen was closed.

Postoperatively the animal was given 5000 units of heparin and 1 g of chloromycetin intramuscularly b.i.d. for 10 days.

There were no postoperative problems. One hundred and thirty-four days after the transplantation procedure the animal was sacrificed to assess the fate of the Fallopian tube.

Postmortem Findings (Fig. 1)

The transplanted oviduct together with the distal cornu appeared completely viable together with its blood supply.
The cornu was widely dilated, compatible with an oestrus response, and healthy fimbriae were found over an ovary which appeared to be filled with enlarged haemorrhagic cystic corpora lutea. Multiple adhesions were noted to be responsible for kinking the uterine cornu and oviduct.

On the macroscopic evidence it was felt that there was no evidence of rejection. Sections of the transplanted oviduct together with its artery and vein were then submitted for histological examination.

**Histology (Figs 2 - 4)**

The cornual anastomosis was viable. Stitch granulomata were present but no cellular reaction of rejection was seen. The sections of oviduct showed normal-looking tissue with no significant inflammatory cell infiltration. A slight serosal reaction was observed. Both artery and vein were patent. A slight accompanying inflammatory infiltrate was present, but evidence of rejection was absent.

**DISCUSSION**

The Fallopian tube is an organ which in the healthy state performs the complex functions of ovum pick-up, assists in the selection of spermatozoa and enables fertilisation and cleavage to occur before release of the morula into the uterine cavity. Such function, while highly specialised, is of very short duration, and is completed within 3 to 7 days.

This suggests that the hazard of rejection need only be prevented for a short space of time and, furthermore, the organ can always be removed at a later date with relative impunity. It is known that the pig is unique in its immunological reaction to vascularised allografts, and thus the absence of rejection as seen in this case must be interpreted with caution. Nevertheless, the temporary requirement of tubal function, backed by maximal blood group and histocompatibility matching, should reduce the immunological and immunosuppressive hazards to a minimum. It is possible that local immunosuppressive techniques alone may suffice for such a short-term requirement.
The technical problems encountered in effecting homograft transplantation of the oviduct in the pig were far more difficult than would be anticipated in the human female. The histological evidence of complete viability is proof of the technical feasibility of the procedure (similar results have recently been noted in 2 further cases). These points, considered in circumstances where many of our patients suffer from the problem of tubal infertility, while the healthy Fallopian tubes of others are removed daily at hysterectomy or sterilisation procedures (an unending source of donor material), force us to seriously consider the possibility of homograft transplantation of this structure in the human female.

As opposed to the pig, reliable stimulation of fertilisable ovulation would be possible, and if technically feasible such an operation may result in providing the patient with a viable, healthy, functional Fallopian tube capable of initiating a pregnancy.

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REFERENCES

Chronic Scleroedema

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SUMMARY

Two patients with chronic scleroedema are presented. One patient had severe joint contractures. The literature on scleroedema is reviewed and the relationship of scleroedema to the stiff skin syndrome is discussed.


The dermal deposition of mucopolysaccharide is found in genetic and acquired disease. Skin changes are described in the type 1 and type 2 mucopolysaccharidoses (Hunter and Hurler types) and in types 4 and 5 (Morquio and Scheie types). Skin changes in these patients are generally present over the hands, but may be more extensive. Histologically both epidermis and dermis are involved. Scleroedema, an acquired disease, is also characterised by excessive dermal mucopolysaccharides. The changes, which are said to spare the hands, may be localised or extensive.

The purpose of this report is to record 2 further cases with prolonged scleroedema and in whom the effect of the disease led to their attendance at an Arthritis Clinic for the evaluation of joint disease.

CASE REPORTS

Case 1

The patient, a 28-year-old woman, was first seen at the age of 11 years, after the abrupt onset of severe generalised stiffness of the skin. Examination at the time showed a thickened waxy skin over the chest, upper arms, neck and face, and to a lesser extent over the upper thighs. No treatment was prescribed, and during the ensuing years there was a general clearing of the skin. Re-attendance at the hospital 17 years later was necessitated by pain in the neck. Examination showed thickening of the skin over the upper arms and posterior aspect of the neck. The sternomastoids felt firm, but the skin of the anterior aspect of the neck appeared normal. The movements of the neck were normal, except...