Histology of the Fibrin Tunnel Fistula with Respect to Haemodynamic Changes

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The anastomosis of the Cimino-Brescia fistula has a tendency to enlarge with time (Shaldon, 1968) and a higher blood flow can influence cardiac output (Conte, 1968). Fistulae constructed by means of a new non-resorbable fibrin tunnel (Bartoš et al, 1967) represent a constant and known resistance in the circulation, which enables a sufficient blood flow for the dialysis, but prevents the development of any cardiac overload.

![Figure 1. Comparison of the cross section of the fibrin tunnel fistula vessels with the contralateral side.](image)

Upper. Fibrin tunnel fistula vessels. A. dilated radial artery 5 mm proximal to the fibrin tunnel; B. fibrin tunnel; C. cephalic vein 3 mm beyond the fibrin tunnel with the layer of fibro-muscular hyperplasia of intima; D. enormous dilatation of the cephalic vein 18 cm beyond the fibrin tunnel.

Lower. Cross section of the vessels from the contralateral side on the same level as in the upper row. a. radial artery of the distal part of the forearm; c. cephalic vein of the distal part of the forearm; d. cephalic vein of the proximal part of the forearm.

From a patient 30 years old, 41/2 months after construction of the fistula.

x 5.5, Van Gieson elastic fibre stain
Figure 2. Regressive changes in the fibro-muscular hyperplasia of the intima.
   a. Cross section of the cephalic vein 3 mm beyond the fibrin tunnel 2 months after
      construction of the fistula. In the hyperplastic intima, the smooth muscle cells
      are particularly increased. With the hypertrophy of the smooth muscle cells of the
      media, the picture simulates s.c. blocking an artery. x 56, Van Gieson elastic
      fibre stain
   b. Cross section of the cephalic vein 3 mm beyond the fibrin tunnel 2 years after
      construction of the fistula. The first signs of the scarring are collagenous fibres
      (S) in the hyperplastic intima, especially near the internal elastic lamina. The
      media is narrowed, with atrophy of the smooth muscle cells. x 96, Van Gieson
      fibre stain

Figure 3. Diagram of the fistula, showing localisation of the cross sections demon-
strated in Figure 1

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Twelve fibrin tunnel fistulae running from 14 days to 2 years were examined and development of the histological changes was studied.

1. The radial artery was found to be dilated and elongated in comparison to the contralateral side at two months to two years after construction of the fistula (Figure 1Aa).

2. The fibrin tunnel was not thrombosed in any case (Figure 1B).

3. At the same time, fibro-muscular hyperplasia of the intima appeared in the one or two cm long segment of the vein close to the fibrin tunnel, which could form an additional resistance. Because in some cases the fibro-muscular hyperplasia was in a layer, it can be assumed that the main cause was a stream of blood flowing from the tunnel and striking against the wall (Figures 1C and 2a).

4. After two years, regressive changes developed, which could lead to phlebosclerosis and aneurysm formation (Figures 1D and 2b).

Even though the fibrin tunnel fistula is a notable advance in dialysis technique, the intrinsic changes in the wall of the vein limit its infinite function.

REFERENCES

