SHORT REPORT

Venous Hypertension in the Hand and Forearm after Brachioaxillary Graft Formation

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We describe a patient on long term haemodialysis with signs of venous hypertension in the hand and forearm, but not the upper arm. This was caused by a venous outflow stenosis of a brachioaxillary graft. Duplex ultrasound and fistulogram showed a venous outflow stenosis with a large collateral feeding the forearm veins. The symptoms improved rapidly after revision of the anastomosis. Striking was the lack of signs in the upper arm despite the stenosis being in the axilla. The filling of the forearm venous system via the deep brachial veins lead to signs of venous hypertension in the forearm only.

Background

A well functioning arteriovenous access is vital for patients with end stage renal failure requiring haemodialysis.1 If no autologous options for a fistula are feasible, a synthetic graft may be necessary. Vascular complications of arteriovenous fistula and graft formation include thrombosis, chronic ischaemia, aneurysm formation and venous hypertension.1–3

Venous hypertension in the arm usually results from central vein stenosis or stenosis in the peripheral arteriovenous access outflow vein.2 Both of these lead to higher distal venous pressures and development of symptoms such as neuralgia, limb oedema, skin discoloration, pigmentation and ulceration.1–3

We describe the case of a patient on long term haemodialysis, who presented with symptoms and signs of venous hypertension limited to the hand and forearm. This was caused by an effective venous outflow stenosis of a right brachioaxillary graft and retrograde flow via a collateral vein into the forearm.

Report

An 83 year old woman started haemodialysis in March 2002. Between 2002 and 2005, she had multiple renal access procedures as illustrated in Table 1 as well as bilateral central venous catheters.

By May 2005, access in the left arm had become impossible because of an untreatable central vein occlusion. Therefore, a right brachioaxillary graft was made.

In July 2006, she presented with pain and swelling in the right arm. Clinical examination revealed a dusky and oedematous right hand and forearm. Prominent superficial veins and skin changes consistent with chronic venous hypertension were noted in the hand and the forearm (Fig. 1). The arm, shoulder and chest were unaffected.

A duplex ultrasound of the right arm showed a stenosis just beyond the venous anastomosis. More specifically, the venous outflow of the graft consisted of a narrow vein draining in the axillary vein. Just beyond the venous graft anastomosis, there was retrograde flow in venous collateral towards the elbow which communicated with the deep forearm veins.

A fistulogram confirmed a venous outflow stenosis just beyond the anastomosis in the form of a group of small calibre veins draining in the axillary vein (Fig. 2). The central veins were patent. The retrograde filling of the forearm veins via the collateral vein in the upper arm led to venous hypertension of the forearm and the hand.

The right brachioaxillary graft was revised in August 2006. The outflow stenosis and the presence of a well developed collateral feeding the forearm veins was confirmed (Fig. 3). Interestingly, she also

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had a well developed duplex axillary venous system. The anastomosis was taken down and new end to side anastomosis with a posterior axillary vein was made. The pain in the forearm and hand disappeared within 24 hours. The oedema and erythema in the forearm subsided within a few days (Fig. 4). The reversal of blood flow seen in the deep veins of the upper arm and the forearm was no longer present on repeat duplex ultrasound in September 2006.

**Discussion**

Venous hypertension is a recognised complication of arteriovenous fistula and graft formation.\(^1\)\(^-\)\(^4\) Large case series reported revealed a prevalence of 0.1\(^%\)^3 to 12\(^%\).\(^4\) Many are secondary to a central vein stenosis or the formation of a side to side anastomosis. The latter results in reversed blood flow, alteration of venous valves and filling of the veins in the distal part of the limb.\(^2\)\(^-\)\(^3\) Nowadays, most arteriovenous fistulas are made in an end to side fashion and a central vein stenosis is the most common cause of arm swelling. Moreover, a stenosis of the peripheral outflow vein may lead to venous hypertension.\(^4\)\(^-\)\(^5\)

The interesting aspect of this case is the lack of signs and symptoms in the right upper arm despite the stenosis being in the axilla. The brachioaxillary graft was made in an end to side fashion in order to preserve as much of the venous outflow as possible. However, an outflow stenosis just beyond the dialysis...
graft caused preferential reversed flow into the deep venous system below the elbow (Fig. 2). The resulting filling of the forearm venous system, via the collateral vein in the upper arm, led to signs and symptoms of venous hypertension in the hand and forearm leaving the upper arm unaffected. Isolated forearm and hand venous hypertension in forearm PTFE grafts has been described in the literature, but the presence of a collateral vein from the upper arm feeding the deep forearm veins and hence sparing the upper arm has to our knowledge not been described. This is in contrast to venous hypertension secondary to a central venous stenosis and a functioning arteriovenous fistula which usually affect the whole arm.

References


Accepted 14 January 2007