

# The structure of the cusps of valves in the human foetal great saphenous vein

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*The study was performed on 110 great saphenous veins in human foetuses of both sexes aged 9 to 37 weeks. The earliest well-shaped valves were observed in foetuses aged 13 weeks. In these foetuses the number of valves varies from 2 to 7. Consecutive microscopic sections revealed that the developing valves at their origin present thickening of the endothelium which is continuous into the cusps of the valves. The bicuspid cusps are crescent-shaped and both surfaces are lined by endothelium.*

**key words:** human development, venous valves, great saphenous vein

## INTRODUCTION

The venous valves have been described as paired, slender crescent-shaped flaps of the endothelium and they are present at the same level [1, 2]. Only a few cases of unicuspid or tricuspid valves of the great saphenous vein have been described [3, 6–10]. The aim of the present study is to trace the development of the valves in foetuses from the 9<sup>th</sup> week onward.

## MATERIAL AND METHODS

The study was performed on 110 great saphenous veins of human foetuses of both sexes (66 veins in male foetuses and 44 in female foetuses; 73 veins in the right lower limbs and 37 veins in the left lower limbs). The age of the foetuses was between 9 and 37 weeks.

The lower limbs of the 9 to 10-week-old foetuses were embedded in paraplast and sectioned serially in the transverse plane.

In foetuses aged 11 to 23 weeks the small saphenous veins were removed and sectioned serially in transverse and longitudinal planes. Histological sections 5  $\mu$ m thick were stained with haematoxylin and eosin. The wall of the vein and the valves were evaluated from serial sections.

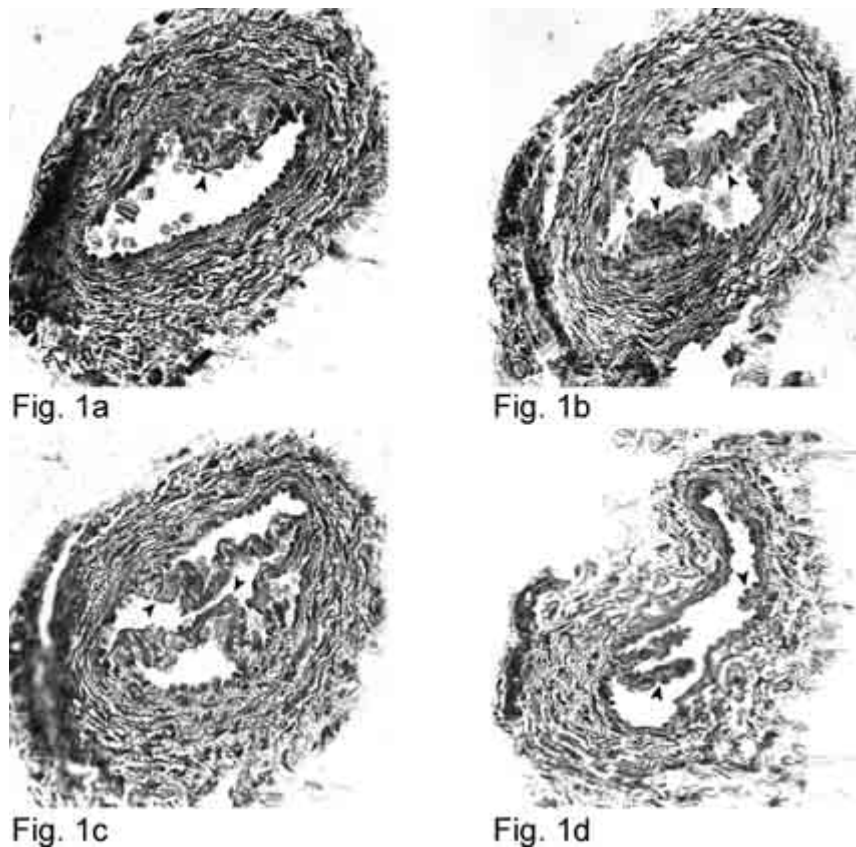
In foetuses between 24 and 37 weeks the veins under investigation were cut longitudinally along the anterior aspect and the valves were inspected.

## RESULTS

The earliest well-shaped valves were observed in foetuses aged 13 weeks. In these foetuses the number of valves varied from 2 to 7. The valves consisted of endothelium and were bicuspid and crescent-shaped. At the first microscopic section of the valve in foetuses aged 13 weeks any sign was noted of the origin of bicuspid venous valves as a condensation of the endothelium (Fig. 1a). Consecutive microscopic sections revealed that the condensation of the endothelium increases (Fig. 1b) and that it takes on the shape of a parabolic curve gradually projecting from the venous wall (Fig. 1c, d). In all the foetuses investigated aged 13 to 37 weeks the valves had the same shape and structure.

## DISCUSSION

In the present and previously performed studies [4, 5], the earliest well-shaped valves were observed in the great saphenous vein in foetuses that were 13 weeks old. According to Bochenek and Reicher [1] the valves in superficial veins appear in the 3<sup>rd</sup> month,



**Figure 1.** Transverse section of the great saphenous vein of a 13 week-old human foetus. Consecutive sections through the length of the valves from origin (Fig. 1a) to the end (Fig. 1d).

while Kampmeier and La Fleur Birch [7] observed valves in 3.5 month-old foetuses.

In our study, only bicuspid valves were observed. Other authors describe unicuspid and tricuspid valves [9, 10].

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