

# UNILATERAL ELEVATION OF THE INTERNAL JUGULAR PULSE

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This paper describes a group of patients in whom the venous pressure, as shown by a distended and pulsating internal jugular vein, appeared to be raised on the left side but not on the right side. The external jugular vein was not necessarily prominent. During quiet respiration the level of the venous pulse remained high, to the angle of the jaw at 60° in some patients, but on deep inspiration the vein collapsed and the pulsation disappeared. The level during expiration rose gradually by a series of systolic kicks.

Over a period of nine months 16 patients were seen with this phenomenon. All the patients were female except one man who had temporal arteritis. Excluding one 13-year-old girl who had mitral regurgitation, the age range was from 38 to 79 years. The majority were between the ages of 45 and 55 and had moderate systemic hypertension. When such patients have presented with cardiac symptoms such as shortness of breath or chest pain, the finding of a raised jugular venous pressure has occasionally led to an erroneous diagnosis of heart failure.

González Sabathié (1934) and Shirley Smith (1960) have described a fixed filling of the left external jugular vein, which they attributed to obstruction of the innominate vein by a high and rigid aorta, since the innominate vein lies between the manubrium sterni and the aorta and great vessels. The pressure in the left antecubital vein was higher than the right in four of the subjects investigated by Shirley Smith. They did not comment on the presence or absence of pulsation in the internal jugular vein.

We have investigated 6 of our 16 patients and believe that an unfolded aorta can also produce the condition we have described.

## METHODS

Under local anæsthesia with no premedication a catheter was passed to the superior vena cava (S.V.C.) through the left antecubital vein. The pressure was measured with a Cambridge transducer during steady withdrawal from the superior vena cava to the left subclavian vein, and the difference was best demonstrated during held expiration when the manubrium was closer to the aorta, but was also shown during normal quiet respiration.

In addition to pressure measurements we have carried out cine-angiograms with the help of Dr. Keith Jefferson and Dr. Rodney Michell. Opaque medium was injected under pressure (40 ml. of 76% urograffin at 20 lb./in.<sup>2</sup>) into the left subclavian vein via a No. 7 Cournand catheter, during held expiration. A timing marker activated by the R wave of the cardiogram (Sloman and Davies, 1959) was also present in the X-ray field. Cine-angiograms were taken at 32 frames/sec. on 35 mm. film using a Phillips 5 in. image intensifier.

RESULTS

When the catheter was withdrawn during held expiration from the superior vena cava to the left subclavian vein a rise of pressure of 5–12 (average 8) mm. of mercury was recorded (Fig. 1). The change in pressure was abrupt and occurred behind the manubrium sterni in all patients. Deep inspiration abolished the pressure gradient (Fig. 2) and held expiration accentuated it (Fig. 3).

Similar measurements on subjects who underwent catheterization for other reasons did not show a pressure gradient between the superior vena cava and innominate vein (Fig. 4). The cine-angiograms confirmed that there was obstruction of the innominate vein behind the manubrium. This was maximal in systole when very little medium flowed on to the superior vena cava (Fig. 5). With each diastole medium flowed smoothly into the superior vena cava (Fig. 6). The compression of the innominate vein was seen to increase markedly during cardiac systole (timed by the electrocardiogram marker).

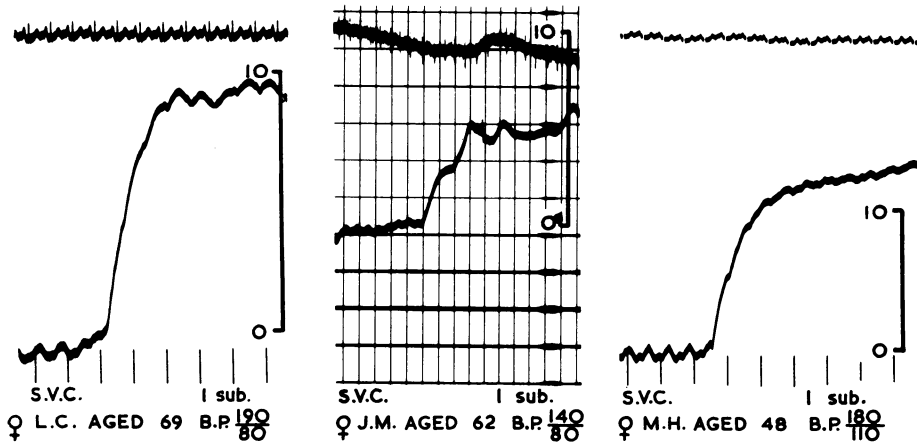


FIG. 1.—Pressure recording from three patients during withdrawal of catheter from the superior vena cava (S.V.C.) to the left subclavian vein (L. sub.). Electrically damped mean pressures mm. of Hg during held expiration.

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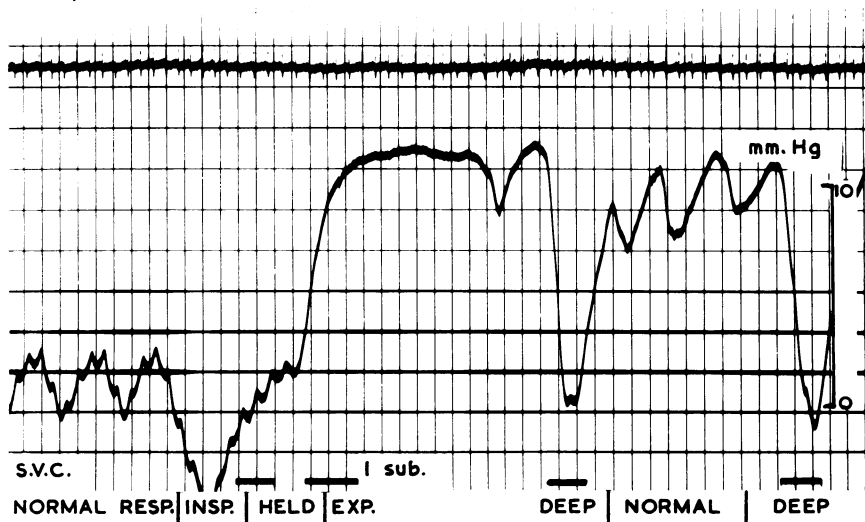


FIG. 2.—The pressure difference abolished by deep inspiration. HELD EXP., with no divider between held and expiration.

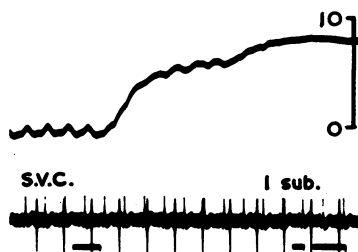
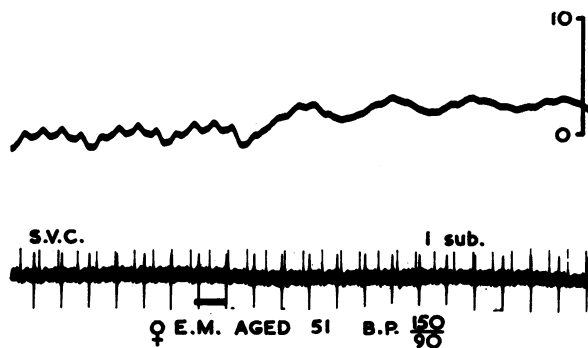


FIG. 3.—The pressure difference increased by held expiration (lower record).

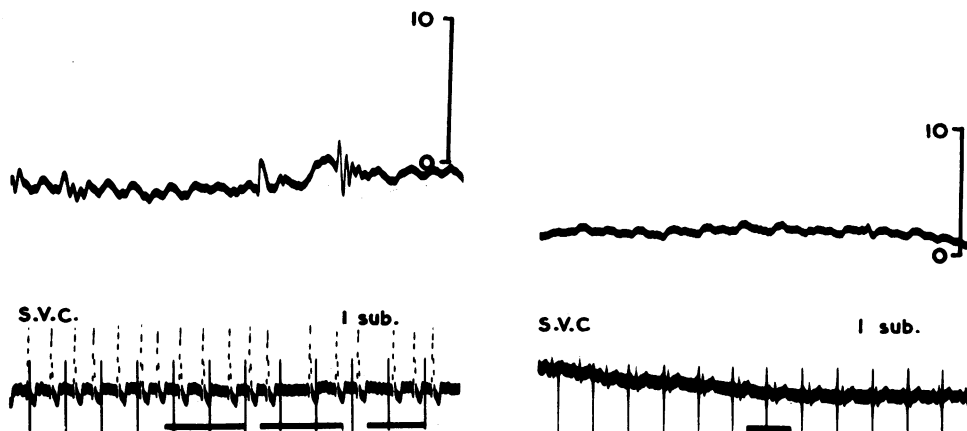


FIG. 4.—Control observations in patients without unilateral elevation of the jugular venous pressure.

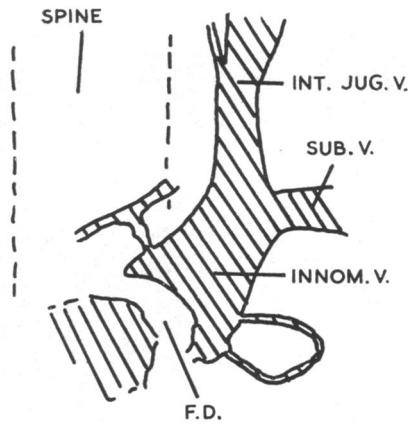
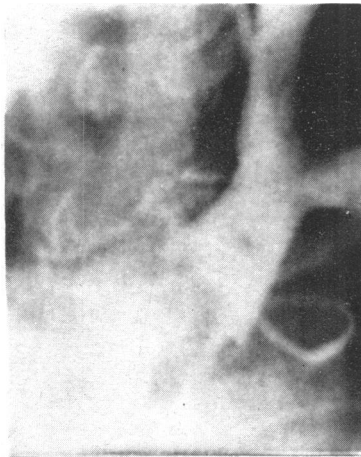


FIG. 5.—Compression of innominate vein during systole. F.D.=filling defect. Innom. V.=Innominate vein. Sub. V.=subclavian vein. Int. Jug. V.=internal jugular vein. Single frame cine-angiogram.

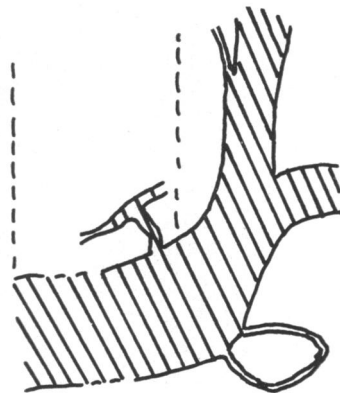
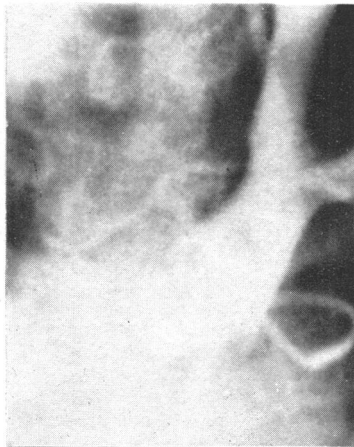


FIG. 6.—Diastolic phase showing medium flowing on in the vein with compression much less (eight frames after Fig. 5).

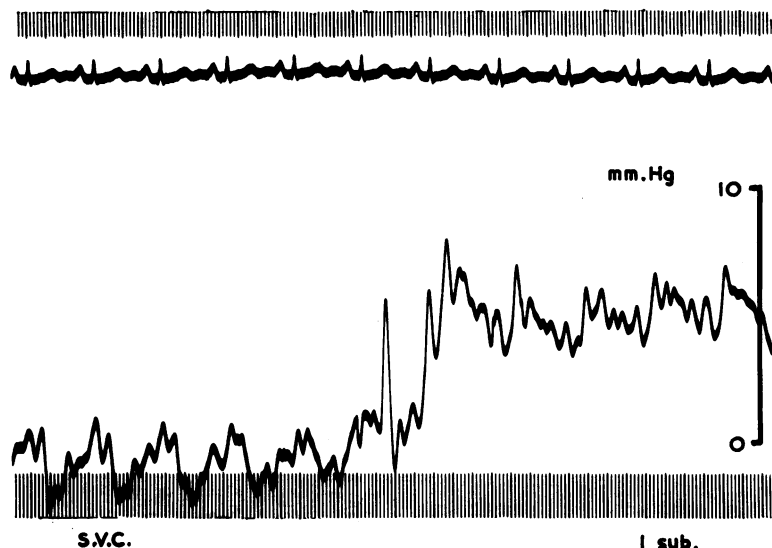


FIG. 7.—Pressure recordings from the patient whose cine-angiogram is illustrated in Fig. 5 (undamped pressure in held expiration).

#### DISCUSSION

The pressure in the internal jugular vein is generally a reliable index of the right atrial pressure (Wood, 1956), but our evidence shows that the appearance of the left internal jugular vein is not uncommonly misleading due to phasic obstruction of the left innominate vein by an unfolded aorta.

When elevation of the left internal jugular venous pressure is seen, it is necessary to exclude the artefact we have described. This may be done by observing the effect of a deep breath on the left-sided venous filling and also by examination of the right internal jugular venous pressure.

#### SUMMARY

Sixteen patients are described in whom there was elevation of the internal jugular pressure on the left side but not on the right. Venous catheterization demonstrated a gradient of 8 mm. Hg (average) between the left innominate vein and the superior vena cava. Cine-angiograms showed a systolic compression of the innominate vein behind the manubrium sterni, which was thought to be produced by an unfolded aortic arch. It is concluded that the venous pressure should be assessed from the right side of the neck and not the left.

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