TABLE

Author	Age	Birthweight (g)	Affected Valve	Other Features
Poynton (1909)	2 dy	Unstated	Mitral	
Plaut and Sharnoff (1935)	1½ hr	1162	Mitral	
Plaut (1939)	1 dy	Unstated	Tricuspid	Multiple pulmonary emboli
McDonald (1950)	17 hr	2135	Tricuspid	Multiple pulmonary emboli, hyaline membrane disease
Boyd (1965, 1967)	21 hr	2550	Tricuspid	Fibrin thromboembolism, hyaline membrane disease
Present case	40 hr	3133	Mitral	Renal emboli, hyaline membrane disease

neonatal period, but failed to record any histological examination of the valve cusp, apart from the statement that numerous organisms were present within the vegetations. The mother in this case had an attack of rheumatic fever late in pregnancy, and Poynton proposed this as the origin of the valvular vegetations.

The present case shows sizeable vegetations on both cusps of the mitral valve with a cellular reaction in the body of the cusp, though no infective agent could be identified. Blood cysts were present on the mitral valve, but there was no evidence of cyst remnants in the base of the vegetations. The atrial dilatation and coronary vein distension are features of cardiac failure, and there was evidence of systemic embolization of fragments of the vegetation to the kidneys. As with the previous recorded cases, with the exception of Poynton's, there seems nothing in the maternal history to account for the infective process.

Boyd (1965, 1967) described a case (3 and 5, respectively) in which there were firm vegetations on the tricuspid valve, but there was no cellular reaction in the valve cusp and he attributed the vegetations to a generalized fibrin thromboembolic disorder. There are, however, certain similarities between Boyd's case and the present one. Both mothers had chronic bronchitis, though without acute exacerbation during pregnancy; and both infants had hyaline membrane disease, the membrane being poor in stainable fibrin in each case, possibly reflecting the generalized fibrin consumption. The vegetations in our case were composed of fibrin and platelets, as were also the thrombi in the renal vessels, and there was a cellular reaction in the valve cusp.

Summary

A case of vegetative endocarditis in an infant aged 40 hours is presented. This very rare finding has only been reported previously in 4 cases.

I should like to thank Dr. J. A. Black and Mr. T. Smith, Jessop Hospital for Women, Sheffield, for permission to publish this case.

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Rippling Mattress Worked From Compressed Air Supply

This communication describes the application of a new technique, i.e. fluidic switching, which can improve the manufacture and hence the clinical application of the rippling air-filled mattress. The application of such devices, e.g. the Hawksley Rippling Bed, to the modern therapy of bed sores is well established: the contribution of this note is to draw attention to some interesting new possibilities in the paediatric context.

The rippling mattress described here operates directly from any compressed air supply having a pressure greater than 0.1 kg/cm² and capable of delivering a flow of 15 l./min (i.e. it is compatible with the standard type of ward and theatre-piped gas outlet point though of course, for reasons of safety, oxygen ought not to be used for this purpose). The air flow to the different mattress segments is controlled entirely by means of fluidic switching elements* mounted under the inflatable part of

*Plessey Bistable Amplifier type BS: see Fig. 1.

FIG. 1.—Fluidic switching element (Plessey type BS). An airflow to the input J will exit from either output O1 or O2. If the output is from O1 then it can be switched to O2 by a transient pressure signal applied to control port C1. A similar pressure signal to C2 will return the output to O1.

the mattress. Apart from the mattress itself there are no moving parts; and no specialized pulsator or pump unit incorporating electromagnetic valves is required. It is, therefore, inherently more reliable, and also the absence of electrically operated components makes it intrinsically safe for use in an oxygen tent or similar environment. Its simplicity should make it cheap to manufacture and to operate.

The movement of most rippling mattresses results from simultaneous inflation and deflation of adjacent segments: in effect this motion is a simple stationary or standing wave pattern. In contrast, the versatility of fluidic control makes it easy to produce a peristaltic or travelling wave pattern of motion in the mattress, and this has been incorporated in our design. It is thought that this feature may be useful in further enhancing circulation to those tissues that are being subjected to pressure.

The rippling mattress was constructed for paediatric use, its size being 70 cm long by 45 cm wide (Fig. 2). The inflatable segments were made simply (and very cheaply) by cutting children's swimming armbands along the seam and laying them flat so that the inflation nipples protruded through the base plate of the mattress. The 10 segments were filled via 5 fluidic bistable switching elements which were interconnected as shown diagrammatically in Fig. 3. The four segments M1, M2, M3, and M4, the two fluidic switches

FIG. 2.—The rippling mattress.

FIG. 3.—The fluidic circuit diagram: the dotted rectangle contains the fluidic oscillator. (*M* = segment of inflatable mattress; *F* = fluidic bistable switching element; *V* = variable constrictor).

F1 and F2, and the four variable constrictors V1, V2, V3, and V4, form a fluidic oscillator in which the pressure build-up in each segment initiates, via the corresponding constrictor, the filling of the subsequent segment, the sequence being automatically recycled by making the pressure in M4 control, via V4, the filling of M1. The remaining 6 segments inflate and deflate synchronously with the four oscillator segments: i.e. M5 and M9 with M1, M6 with M2, and so on. The period of the oscillator is determined by the volume and elasticity of the inflatable segments and also by the variable constrictors: it could conveniently be set to any value between 2 and 10 sec. For a larger mattress the period would have been longer in proportion to the increased segment volume.

The mattress described has been used over the past 4 months for infants with myelomeningocele defects and spinal deformities. These infants, because of their kyphosis, are prone to develop pressure necrosis of the skin over the projecting bone. This tendency is greatest when the infant or child is sick and even more immobile than normal. The mattress has been used for three infants who have such defects and who have been given no special nursing care: there has been no development of pressure sores despite the generally poor condition of one child in particular.

The mattress has also been used for a child with

a pressure sore on readmission and in whom it was anticipated that extension of the sore was more likely than healing. However, during his acute illness considerable healing of this sore occurred.

It is therefore shown that this is an efficient alternative to the established forms of rippling bed and has the advantages listed above. No difficulty or complication has arisen with its use, and it has been considered superior to previous appliances of this type.

Summary

A paediatric mattress is described which is operated directly by compressed air from the standard type of ward and theatre piped gas outlet point. The mattress is entirely controlled by a compact fluidic circuit mounted under its base-plate, and because there are no moving parts and no electrical power supply it is inherently reliable and intrinsically safe for use in an oxygen tent. Clinical trial demonstrates that this new mattress is an efficient alternative to the established forms of rippling bed.

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