THE DANGERS AND EVIL EFFECTS OF INFANT BINDERS.*

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It is interesting to note that those primitive methods of enveloping the infant's body in countless bands, swathes, and swaddling clothes which history reveals to us in the early writings, still continue, though in a varied fashion, even at the present time. It is not unusual to find three or even five separate binders firmly applied around abdomen and chest. The abdominal binder—of varying size—is often recommended to be of sufficient width to extend from the axilla to the hips. It is generally regarded as a necessary covering, for warmth and support; but warmth can be as well supplied by loose clothing, whilst support is not needed.

I am ready to admit that the abdominal binder may be a safeguard against rough handling, but this obviously is not a proper claim. The only possible justification, in my opinion, for the use of the abdominal band is its protection to the ligatured cord during the first two or three weeks of life, but it is not necessary even for this purpose.

The thoracic binder or chest binder, commonly termed the "swade," is applied around the chest close under the axilla by a number of turns, frequently over some undergarment. It happens often that after a few months the swade is discarded in favour of stays of various materials, shapes, and sizes. In addition to these two binders, one or more extra bands are frequently superadded. Finally, one must not overlook the similar constricting effect of long tapes or strings attached to garments and generally firmly tied round the chest or abdomen.

As the result of frequent and repeated examinations of the infant, both in private but more especially in hospital practice, I have been deeply impressed with the vast amount of harm and suffering caused by the discomfort, and the constriction or compression of either abdomen, thorax, or both, by any form of binding. Amongst the well-to-do, where intelligent supervision can be obtained, one may be fortunate enough to meet with a competent nurse or mother, who will appreciate the danger of compression and avoid it. It more often happens that even the trained nurse—or midwife—while desirous of avoiding undue pressure, yet fails to realize the small degree of force necessary seriously to constrict the abdomen and resilient chest walls.

But apart from such probabilities we have to consider the vast majority of the less experienced and ignorant, with whom there is a widespread and deeply rooted belief that binders are chiefly intended to serve as a support. As the result of this misconception they are fixed either tightly or with a degree of firmness sufficient to cause various injurious effects and conditions, which are, I believe, frequently overlooked or unrecognized.

The nature and extent of the injury or condition which may thus result from constriction and increased intra-abdominal and intrathoracic pressure will depend on:

1. The degree of constricting or binding force.
2. The extent of surface covered.
3. The time worn.
4. The health and power of resistance of the infant.

Having thus briefly touched upon the important technical and other points of interest, I will proceed to describe the various effects and conditions which may result from binder compression.

1. *Discomfort.*—In the first place the discomfort alone, even in cases where the binders are not very tightly fixed, may be such as to cause much restlessness, frequent crying, loss of sleep, which if long continued will obviously affect the health of the child. It is astonishing how often even the intelligent nurse or mother will overlook this small matter, and be puzzled to account for such irregularities in a healthy and strong child. When the constricting effect of binders is at all severe, the infant presents outward typical signs which may be at once recognized. The facial expression, a somewhat livid hue, dilated temporal veins especially noticeable when the child cries, restlessness, clenched fists—these and other points readily give the clue.

2. *Vomiting.*—This frequently results from undue constriction, especially when both thorax and abdomen have been covered either by one wide abdominal binder or two or more separate ones. This compression prevents probably that natural distension of the abdomen which regularly occurs after a good feed. The effect being often enhanced by some flatulent distension, the vomiting is obviously more of the nature of a regurgitation. I see many cases of this kind in which the nurse or mother, not recognizing the cause of the vomiting, assumes that it is the result of some stomach trouble, and proceeds to administer drugs, reduce the quantity or weaken the milk, or probably change the food to something unsuitable. The last state will then become worse than the first, and eventually the child may sink to a condition of serious debility and marasmus.

3. *Inguinal and Umbilical Hernia.*—Inguinal hernia is obviously most likely to result from an increase in both the intra-abdominal and intra-thoracic pressures from the tight application of either one wide binder, such as the abdominal or thoracic, or two or more separate binders enclosing both abdomen and thorax, the whole pressure of the abdominal contents being thus thrown on the inguinal region. It is reasonable to assume, however, that even where only one narrow abdominal or thoracic binder has been applied fairly tightly, the tendencies will be in the same direction. The extra strain caused by such influences as the difficulty of micturition from phimosis, the vigorous cries of the infant, or persistent cough, such as whooping-cough, must not be overlooked. As to the type of hernia which may be thus caused, I am conscious that there will be some divergence of opinion. It is a significant fact, according to my experience, that the so-called congenital inguinal hernia of infants rarely appears before the third week, generally later. I am inclined to the view that in the majority of cases an inguinal hernia in infants is acquired, either by the bowel being forced, with varying degrees of rapidity, through a narrow, partially-closed, though patent, processus vaginalis testis, or probably, in the case of older infants, the bowel is forced into a partially obliterated processus vaginalis. As to umbilical hernia, much the same mechanical conditions apply; but I would point out that, although the abdominal binder is often applied with the intention partly of preventing a hernia, it generally happens that it slips upwards, uncovering the umbilicus, and thereby tending to produce the very evil which it was intended to prevent.

4. *Prolapsus Ani.*—I should mention also the causation of haemorrhoidal distension of veins, and even prolapsus ani—as the result of long-continued binding—in older infants.

5. *Thoracic Deformities.*—The thoracic binder, or swathe, when applied tightly and firmly and continuously, may arrest the growth and development of the chest considerably. Amongst the poorer classes, where extreme cases are so often seen, it may be often observed that the whole chest is uniformly contracted with corresponding protrusion of lower margin of thorax and the whole of abdomen. Happily, such a contracted chest may subsequently expand to normal proportions, but long-continued pressure may produce a permanent deformity.

6. *Thoracic Constriction in Pulmonary Diseases.*—I will now call attention to what is obviously an iniquitous and yet a common practice: I refer to the constriction of the chest, or chest and abdomen, by binders in cases of pulmonary disease. Cases of this kind frequently present themselves in the out-patient room, where, for instance, a child some months old may be brought suffering from pneumonia with two or three binders fixed round the chest and abdomen, hampering respiratory movements, impeding free entry of air and oxygenation, and obviously hurrying the case to a fatal issue.

7. *Cerebral Circulation.*—I believe, too, that in cases of severe constriction the cerebral circulation may be so disturbed as to give rise to convulsive seizures and probably more severe consequences.

8. *Overlying.*—Associated with this disturbing effect of binder constriction on the circulation and respiration there is a matter which has seemed to me worthy of serious consideration—I refer to the asphyxia which is the cause of death in cases of overlying. There is no question that amongst the very poor it is quite a common, if not a usual custom, to put the child to bed with its binders on, and one may conclude that, as a rule, they will be fixed on fairly

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tightly; the dangers of asphyxia will be greatly increased by such a constricting effect, and there are good grounds for believing that they take an important share in bringing about the fatal result. I would commend this point for consideration and further evidence.

This concludes my list, though it must not be taken to comprise all the conditions which may result from binding. I venture to hope, however, sufficient evidence has been given to justify a strong condemnation of the common custom.

THE INK POLYGRAPH.

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I EXHIBITED at the meeting of the Medical Section of the British Medical Association in Toronto in 1906 a method of recording the movements of the circulation by means of an ink polygraph. I have not hitherto published a description of this method as there has been some difficulty in getting the instrument made, and the maker until lately has not been able to meet the demand for the instrument.

A long experience in taking graphic records of the movements of the circulation impressed me with the fact that there were many features in these movements which

somewhat like that belonging to a Jaquet sphygmograph, is fastened to the wrist in such a manner that the pad of the steel spring falls on the radial artery and is pressed down by an eccentric wheel, 18, until a suitable movement is transmitted to the spring by the artery; then the broad tambour, c, is fitted on to the splint so that the knob, 12, falls on the moving spring. This wrist tambour is connected to the tambour, B, by india-rubber tubing, 22, 22, and the movements of the radial pulse are recorded by the lever, F. The shallow cup (receiver), E, is placed on the pulsation which it is desired to record, and the movement is conveyed to the lever, F, of the other tambour. In this way simultaneous with the radial pulse a record can be obtained of the apex-beat, carotid, jugular, or other pulses.

To record the respiratory movements a bag can be substituted for the receiver, E.

By turning the screw, 3, the rate at which the paper passes can be quickened or slowed at will. This is of the greatest use, for it often happens that in quickly succeeding events a wider interval may be required, whereas in recording respiratory movements a slow rate is best. As the time-marker registers one-fifth of a second and is driven by a separate clockwork, the rate of the recorded movements can always be ascertained with absolute accuracy.

It has been suggested that another tambour should be added to record three movements, and I have tried this,

it was impossible to investigate satisfactorily by the methods in vogue. Changes in the heart's contraction that occurred at infrequent intervals, or in great variety, were apt to be overlooked, while the relationship of the respiration has never been satisfactorily worked out. There was a necessity, therefore, to devise a method by which tracings could be taken over a period of time of considerable duration. I conceived the idea that if a roll of paper could be unwound and levers could be made to inscribe the movements in ink, the end I had in view would be achieved.

I had considerable difficulties to overcome, but found a skilled helper in Mr. Shaw, who not only comprehended and appreciated my ideas, but constructed an instrument that carried them out. The case, A, in the accompanying figure contains the clockwork for the roller which unwinds the roll of paper, D, and also the separate clockwork which moves the time-marking pen; B, B are the two tambours, and F, F their levers, one of which is represented raised, while the pen of the other is resting on the paper. The writing pens are narrow, grooved wires, one end fixed to the bottom of a small cistern at the free extremity of the lever. The other end of the grooved wire is adjusted barely to touch the paper. The ink is put into the tiny cistern, and it flows along the grooves to the pen-point by capillary attraction. If the pens are kept clean and the ink is free from dust, they serve their purpose most admirably and are ever ready for use.

As the radial pulse is the most serviceable of standards, a special method is employed to record it. A splint, c,

but I have practically discarded it, as, though it might be of use occasionally, it would complicate the apparatus unnecessarily. When making observations single-handed the two tambours are quite sufficient to occupy attention. With a little practice this apparatus can be used with the greatest facility. In the course of a few minutes the different movements can be recorded with the patient sitting up or in the recumbent position.

When the tambour is strapped to the wrist to take the radial pulse, one hand is always free to start the machine and to replenish the ink or regulate the rate, the other hand holding the receiver over the movement to be recorded.

The instrument is made by Mr. S. Shaw, instrument maker, Padiham, Lancashire.

UNDER the will of the late Mr. Richard Henry Wood, of Sidmouth, and formerly of Rugby, the West of England Eye Infirmary, the Devon and Exeter Hospital, and the Hospital of St. Cross, Rugby, each receives a sum of £1,000.

A BOOKLET can now be obtained from the agencies of the Royal Mail Steam Packet Company giving an interesting account of South America from a tourist's point of view. It includes a list of possible trips and of the expenses out and home. It appears to be readily feasible to visit Vigo, Lisbon, Madeira, Pernambuco, Bahia, and Rio de Janeiro in five weeks at an expense of £53. A visit to Santos and Buenos Aires takes somewhat longer. From both Buenos Aires and Rio de Janeiro inland expeditions can be made, the passenger re-embarking at a fresh port.