



## Analysis of Clinical Testing of the Neonatal Hip

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# PROCEEDINGS

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# Analysis of Clinical Testing of the Neonatal Hip

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**ABSTRACT:** *Developmental dislocation of the hip* is a disease of 0.1-0.2% incidence where the neonatal hip develops incorrectly. All health personnel responsible for children require an ability to perform hip testing. To record what hip tests are currently being carried out by a range of examiners, a video analysis system was used to record 38 clinical examiners performing their hip test on a model and also on a neonate. During the examinations we recorded large variation in force applied to the hip. Appropriate pre- and post- experience training for all health personnel responsible for screening may be necessary to permit standardisation of neonatal hip tests.

## I. INTRODUCTION

*Developmental dislocation of the hip* (also known as Congenital Dislocation of the Hip) is a disease of 0.1-0.2% incidence characterised by the neonatal hip developing incorrectly. Recent indications are that the disease is not necessarily present at birth, i.e. *congenital*, as a small number of cases have documented evidence of a normal hip at birth, yet they develop a dislocated hip later [4,6]. An over-dependence on birth screening is likely to miss late-developing cases and therefore screening for hip deformities needs to continue after the baby leaves the security of the maternity hospital [3].

Thus all health personnel responsible for screening young children for this condition require an ability to perform accurate hip testing [8]. The current method of detecting this condition is using manual hip manoeuvres known as the Ortolani [7] and Barlow [1] tests. The criteria for sensitive detection include correct force, baby's hip and knee position while being tested and examiner's hand position. In the more accepted procedure the hip and knee are flexed to 90° and the hand position is "classical" with the fingers pointing along the femur. The pelvis is stabilised firmly with the examiner's hand and a gentle controlled force is applied along the line of the femur.

## II. METHOD

In light of this background we set out to record what hip tests are currently being carried out by examiners using a video analysis system. A total of 38 examiners were asked to demonstrate their hip test on a teaching model [2] called "baby-hippy"; and also on a neonate (average age 16.5 days). Using "baby-hippy" they were able to demonstrate their ability to detect abnormalities as it was fitted with one dislocated and one dislocatable hip. The examiners included 11 senior house officers, nine consultants, four midwives, four health visitors, three community medical officers, five nurses and two senior registrars. The examinations were recorded using a portable VHS recorder and later objectively analysed using a standard form by the research team.

## III. RESULTS

When testing the 38 neonates the Ortolani test was carried out by all 38 personnel; the Barlow test performed by 25. Of these 63 examinations carried out nine employed excessive force; 33 used reasonable force; and 21 used insufficient force. Many examiners (N=17) used an incorrect hand position where they "cupped" the leg distal to the babies' over-flexed knees with the thumb pointing to the babies' head, rather than into the groin. Although 16 of these did perform the test with the hips in 90° of flexion, eight were noted to perform rotary movement or "stirring" as opposed to abduction and leverage.

When testing the "baby-hippy", not all examiners carried out both tests; not all elicited the appropriate sign and not all recognised the sign when it was correctly produced (see Figs. 1 & 2).

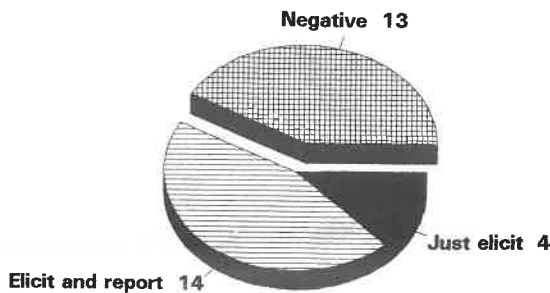


Fig. 1. Only 45% of the 31 examiners who performed Ortolani testing elicit and recognise the sign on the dislocated hip.

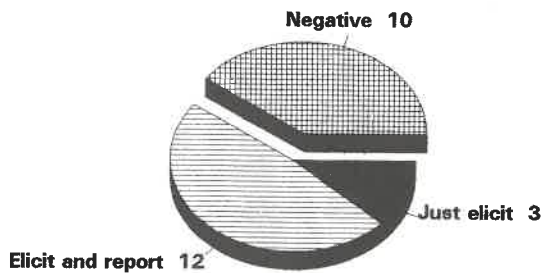


Fig. 2. Only 48% of the 25 examiners who performed Barlow's testing elicit and recognise the sign on the dislocatable hip.

The highest rate of elicitation of the Ortolani test (80%) was found amongst examiners who stabilised the pelvis directly. When excessive force was used the rate of elicitation of the test was significantly less (Fig. 3). The classical hand position produced the highest success rate, although the difference is not significant.

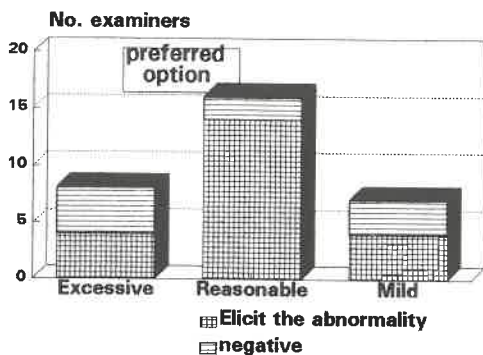


Fig. 3. When excessive force was used the rate of elicitation of the test was significantly less

Less than half of the examiners elicit and recognise the positive Barlow's test on the unstable right hip (Fig. 2). The highest rate of elicitation (75%) was again found among examiners who stabilise the pelvis directly. Also, when excessive force was used, the lowest rate of elicitation was achieved, although the difference here was not significant. Examination of video recordings showed variation in the testing procedure. The problems were over flexing of the hips and knees, indirect stabilisation of the pelvis, variation in force and inadequate hand position.

#### IV. CONCLUSION

A substantial range of hip tests are currently being carried out with various force by health personnel. It is unlikely that all examiners are achieving the sort of sensitivity and specificity which would be required in a screening test.

Presently, we use vibration arthometry [5] as an objective means of determining the presence or absence of the condition. We propose to further develop the recording technique to include not only video and vibration arthometry but also measurements of *displacement* of the hip in abduction and *force* applied by the examiner so that a standard hip test may be well defined and then tested both in hospital and in the community situation. Appropriate pre- and post- experience training of health personnel may be necessary to permit standardisation of neonatal hip tests.

#### REFERENCES

- [1] T. Barlow: Early diagnosis and treatment of congenital dislocation of the hip. *J. Bone Joint Surg.*, Vol. 44B, pp. 292-301, 1962.
- [2] W. Cole: Evaluation of a teaching model for the early diagnosis of congenital dislocation of the hip. *J. Pediatr. Orthop.*, Vol: 3, No. 2, pp. 223-226, 1983.
- [3] J. Fixen: Congenital dislocation of the hip and club foot in the young child. *Health Visit.*, Vol: 56, No. 8, pp. 281-283, 1983.
- [4] F. Ilfeld, G. Westin, M. Makin: Missed or developmental dislocation of the hip, *Clin. Orthop.*, No. 203, pp. 276-281, 1986.
- [5] W. Kernohan, G. Cowie, R. Mollan: Vibration arthometry in congenital dislocation of the hip. *Clin Orthop.*, No. 272, pp 167-174, 1991.
- [6] P. Klisic: Congenital dislocation of the hip —A misleading term, *J. Bone Joint Surg.*, Vol. 71B, p. 136, 1989.
- [7] M. Ortolani: Un segno poco noto e sua importanza per la diagnosi precoce di prelussazione congenita dell'anca. *Pediatria*, Vol. 45, pp. 129-136, 1937.
- [8] J. Poul, J. Bajerova, M. Sommernitz, M. Straka, M. Pokorny, F. Wong: Early diagnosis of Congenital dislocation of the hip, *J Bone Joint Surg.*, Vol. 74B, pp. 695-700, 1992.