

The Aetiology of Brachial Plexus Injury: What the Paediatrician and Obstetrician need to know

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Abstract

The recognition of brachial plexus injury (BPI) after childbirth suggests to parents a causative rather than temporal relationship. This view is supported by textbooks of paediatrics, which state that: 1. the mechanism of injury (a forceful separation of the head from the shoulder by lateral bending of the neck with simultaneous shoulder depression, during vaginal delivery); and 2. these injuries are due to traction on the brachial plexus during delivery. Although an obstetrician will talk to a parent when BPI occurs, the ongoing care of the child is within a multidisciplinary team, where the paediatrician and obstetrician play leading roles. Parents will ask about aetiology, treatment and prognosis; but is the textbook explanation adequate? We illustrate the potential dilemma for the paediatrician and obstetrician through 2 cases of BPI and outline some data on BPI, which is not congruent with current paediatric texts.

Case 1

An infant was born to a 32 years old G1 P0 healthy mother, at eleven days post-term, birth weight 4,180 grams, following a normal antenatal course. Labour occurred spontaneously and the foetus was a cephalic presentation. The baby experienced shoulder dystocia and required a vacuum assisted delivery. Classic Erb's palsy posture of the left upper limb was noted. X-ray confirmed a fracture of the middle one-third of the left clavicle. Physiotherapy was commenced and by the third week of life, normal gross and fine motor functions of the limb were recovered.

Case 2

The second infant, delivered 2 years later by normal vaginal delivery, was also a cephalic presentation, birth weight 4190 grams, following a normal pregnancy. This labour was complicated by an episode of severe acute abdominal pain, which remained unexplained despite post-partum investigations. These included computerised tomography of the pelvis, which was normal. In the delivery room, abnormal posturing of the left arm, consistent with (BPI), was noted. X-ray confirmed clavicular fracture. Physiotherapy was commenced. By 12 months of age, there was incomplete resolution of the BPI.

Discussion

BPI is a random event, with an incidence of 1 in 1,000 and this has remained unchanged over the past 40 years.³ Recognised risk factors include shoulder dystocia (odds ratio [OR] 340.5; 95% confidence interval [CI] 46.9 to 897.3), fetal weight greater than 5000g (OR 17.9; 95% CI 15.8 to 128.8), fetal weight 4501 to 5000g (OR 17.9; 95% CI 10.3 to 31.3), fetal weight 4001 to 4500 g (OR 9.6; 95% CI 6.2 to 14.9), vacuum extraction (OR 17.1; 95% CI 15.1 to 58.2).⁴ A review of 9 studies involving 1430 dystocia events resulted in 168 (11.7%) episodes of transient BPI.

Does the obstetrical literature support the causative relationship between BPI and the occurrence of iatrogenic trauma with dystocia? A retrospective analysis of 14 studies, evaluating 1284 occurrences of BPI noted that dystocia was absent in 692 (53.4%).

The absence of dystocia is linked to a poorer prognosis. In a retrospective analysis of 40 patients, 7 of 17 (41%) without dystocia and 2 of 23 (8.7%) with dystocia (p = 0.04) had persistence of symptoms beyond 1 year. The weight of infants without dystocia was 3.9 +/- 0.12 kilograms and with dystocia was 4.2 +/- 0.104 (p = 0.08).

BPI has been described in a case series of 6 patients after caesarean section.⁷ In 5 patients there was an abnormal labour and in 1 an elective procedure. All infants had BPI beyond 1 year of age.

Could maternal and uterine forces play a role in BPI? Recently, mathematical models have been constructed to estimate compressive pressure on the foetal neck overlying the roots of the brachial plexus by the symphysis pubis during a shoulder dystocia event. Pressure was calculated for exogenous (physician applied) and endogenous (maternal and uterine) forces during the second stage of labour. Clinician applied forces were estimated at 22.9 kPa but uterine and maternal forces were estimated to range from 91.1 to 202.5 kPa (a factor of 4 to 9 times greater than clinician applied forces). This suggests that endogenous forces can play a significant role in BPI. We are uncertain, but speculate that the pain experienced in the second stage of labour may have contributed to BPI in Case 2.

Retrospective data is inferior to randomised controlled trials (RCTs) and may overestimate the effect being evaluated.⁹ Given that BPI is a random and unpredictable event, RCTs cannot be undertaken.

Conclusion

We feel that it would be prudent for paediatricians and obstetricians discussing BPI with parents to be aware of the current obstetric literature, outlined above, especially if dystocia is absent, given the associated poorer prognosis for the child.

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