

CASE REPORT

A case of Klumpke's obstetric brachial plexus palsy following a Cesarean section

Mohammad M. Al-Qattan¹ & Amel A. F. El-Sayed²

¹Division of Plastic and Hand Surgery, Department of Surgery, King Saud University, Riyadh, Saudi Arabia

²Department of Obstetrics and Gynecology, King Saud University, Riyadh, Saudi Arabia

Correspondence

Mohammad M. Al-Qattan, Division of Plastic and Hand Surgery, Department of Surgery, King Saud University, PO Box 18097, Riyadh 11415, Saudi Arabia.
Tel: +966505274885; Fax: +96611-4679493; E-mail: moqattan@hotmail.com

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Closed injuries to the brachial plexus from traumatic delivery have been classified into three types [1]. Upper Erb's palsy involves the fifth and sixth cervical roots (C5,6) resulting in paralysis of shoulder abduction/external rotation as well as elbow flexion. Extended Erb's palsy involves the fifth, sixth, and seventh cervical roots (C5,6,7), and hence, wrist drop is also seen; the new born presents with the "waiter's tip posture" (the shoulder is adducted/internally rotated, the elbow is extended, and the wrist is flexed). In total palsy, all roots of the brachial plexus are involved (C5,6,7,8 roots as well as the first thoracic root). All these types of obstetric palsies have been related to excessive forces on the shoulder or neck during delivery. In cephalic vaginal delivery, there is usually a history of shoulder dystocia because of fetal macrosomia [1]. In breech vaginal delivery, there is usually a difficulty of delivery of the "after coming head" [2]. In Cesarean section deliveries, there is usually a history of excessive shoulder or neck manipulation while delivering the baby through the uterine incision [3].

Klumpke's palsy is the term given to isolated lower brachial plexus injury involving the eighth cervical and first

Key Clinical Message

It is generally thought that Klumpke's palsy is not seen as obstetric injury. The authors present a case of Klumpke's palsy with Horner syndrome following delivery by emergency Cesarean section. Neurolysis and nerve grafting partially corrected the paralysis.

Keywords

Brachial plexus, Cesarean section, Klumpke's palsy, obstetric.

thoracic roots (C8,T1) resulting in loss of digital flexion and hand intrinsic function. The palsy may also be associated with Horner syndrome (ptosis, meiosis, and anhydrosis) as the ipsilateral facial sympathetics are known to arise from the proximal T1 root [4]. Biomechanically, Klumpke's palsy can only occur if there is hyperabduction of the arm. Hence, the palsy is usually seen in motor bicycle injuries when the upper limb is entrapped resulting in arm hyperabduction [5]. During delivery, hyperabduction of the arm may occur with breech deliveries if the arm was not brought beside the body. Failure to bring the arm down during delivery of the body is not seen with modern obstetric practice, and hence, Klumpke's birth palsy is generally considered of historical interest only [6]. A review of the recent literature revealed a single case of Klumpke's birth palsy following a vaginal delivery with compound arm presentation, which may have resulted in an hyperabducted arm in utero and during labor [7].

The authors report a case of Klumpke's birth palsy in an infant born by emergency Cesarean section. Unique features of the case include the combination of Klumpke's

palsy and Horner syndrome, and the partial correction of the deformity by early surgical exploration of the brachial plexus.

Case Report

A 4-month-old infant presented with right Klumpke's birth palsy. Delivery was by an emergency Cesarean section because of premature labor and fetal distress at 35 weeks of gestation. The pregnancy was uneventful until the premature labor at 35 weeks. The mother was healthy and was not diabetic or obese. The birthweight was 2.8 kg. The presentation was cephalic. Examination of the birth records revealed that there was difficulty during delivery. Upper limb examination was well documented at birth and showed normal shoulder, arm, and wrist movements, with complete paralysis of digital flexors and hand intrinsic muscles resulting in claw deformity of all fingers. There was also Horner syndrome on the ipsilateral side of the face evident since birth. Physiotherapy was initiated at 10 days postdelivery.

At 4 months of age, the hand paralysis and Horner syndrome persisted (Fig. 1); exploration of the brachial plexus was performed. The phrenic nerve, the C5,6,7 roots, as well as the upper and middle trunks appeared completely normal with no scarring (Fig. 2); this was also confirmed by intraoperative nerve stimulation.



Figure 1. Appearance at the time of presentation. Note the clawed fingers and the ipsilateral Horner syndrome.

Examination of the C8 and T1 roots revealed scarring of the proximal parts of the roots which extended to the spinal foramina. Intraoperative nerve stimulation of these roots as well as the lower trunk revealed no response. Neurolysis of the scarred roots was carried out. An 11 blade was used to cut one fascicle of middle trunk and one fascicle of the lower trunk distal to the scarred area. A nerve graft was used to bridge the defect between the middle and lower trunk fascicles. Fibrin glue was used for nerve coaptation. The shoulder was immobilized in adduction and internal rotation, and the elbow in flexion for 3 weeks. This was followed by resuming physiotherapy. A night splint of the hand was also fabricated to keep the fingers in the intrinsic plus posture (flexion at the metacarpophalangeal joints and extension at the interphalangeal joints) in order to prevent joint contractures. The child is now 15 months after surgery and has recovered $4/5$ power of digital flexors. Claw deformity of the fingers improved, but Horner syndrome persisted (Fig. 3).

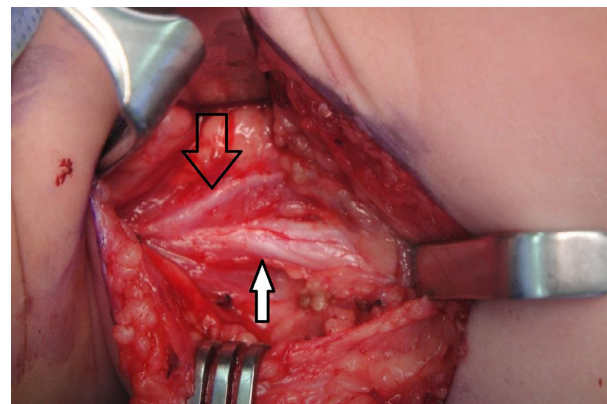


Figure 2. Intraoperative view of the upper brachial plexus. Note the normal appearance with no scarring. The large (top) arrow points to the phrenic nerve and the small (white) arrow points to the upper trunk.



Figure 3. The child is holding a small object 15 months after surgery.

Discussion

The current case has two unique features: the combination of obstetric Klumpke's palsy and Horner syndrome, and the demonstration that early surgical exploration (neurolysis and nerve grafting) is of benefit resulting in partial correction of the paralysis. Horner syndrome is known to be a poor prognostic sign for spontaneous recovery of the motor power in children with obstetric brachial plexus injuries [8]. There was no spontaneous recovery in the current case. No data are available in the literature on the results of surgery in infants with obstetric Klumpke's palsy [6, 7, 9–11]. The parents of the current case were informed about this and were counseled prior to surgery. The parents were also informed that recovery of the intrinsic muscles of the hand might not be complete. Although the postoperative motor recovery was incomplete in the current case, the family was satisfied with the results.

The current case represents the second documented case of Klumpke's birth palsy in modern obstetric practice [7]. The case reported by Buchanan et al. [7] was delivered vaginally. Delivery in the current case was by emergency Cesarean section. It is important to note that Cesarean section has a protective role and reduces the risk of brachial plexus injuries. However, excessive forces can still occur during delivery and about 1% of all reported cases of obstetric brachial plexus palsies occurred in babies delivered by Cesarean section [3]. Furthermore, emergency (rather than elective) Cesarean delivery is known as a risk factor for obstetric fractures and paralysis [12].

Historically, most reported cases of Klumpke's birth palsy were actually total palsy at birth with spontaneous recovery of the upper roots only [6]. A definitive diagnosis of Klumpke's birth palsy should include a clear documentation of the motor examination at birth as well as a completely normal upper plexus by direct examination intraoperatively; this was demonstrated in the current case.

The indication for brachial plexus exploration varies from one birth palsy center to another [1]. In our center, lack of spontaneous recovery by 4 months of age is the indication of surgery [13]. In the current case, we used a nerve graft to connect one fascicle from middle trunk to another fascicle of the lower trunk and this is a form of intraplexus neurotization [14]. By 15 months after surgery, digital flexors recovered almost fully and the claw deformity of the fingers improved. Hand intrinsic muscles are innervated far more distally than the long flexors, and hence, there is still a chance for further recovery of the intrinsic muscles. The long distance from the first thoracic root to the hand intrinsic muscles mandates early surgical exploration of the brachial plexus in infants with

Klumpke's birth palsy in order to provide re-innervation to these muscles as quickly as possible.

Conclusion

The current case has two unique features: the combination of obstetric Klumpke's palsy and Horner syndrome, and the demonstration that early surgical exploration (neurolysis and nerve grafting) is of benefit resulting in partial correction of the paralysis. The current case as well as the case reported by Buchanan et al. [7] also confirms that Klumpke's birth palsy is rare but may be seen in modern obstetric practice.

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Conflict of Interest

None declared.

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