The advantages of using subdural or epidural strips to record DSEPs include the following:

1. The responses were larger compared to cortical DSEPs, probably owing to the larger recording surface areas of the strip and the shorter distance from the stimulating electrode to the recording electrode;
2. Subcortical DSEPs recorded just proximal to the surgical field are more resistant to anesthetic agents;
3. Less averaging was required to obtain a monitorable signal, which was less time-consuming.

CONCLUSION

The advantages of using subdural or epidural strips to record DSEP include the following:

Dermatomal somatosensory evoked potentials (DSEPs) can be used to monitor the integrity of individual sensory roots during surgery for tethered cord syndrome (TCS), spina bifida (SB), cauda equina tumors, and pedicle screw placement. However, conventional DSEP recordings at the vertex of the skull are technically difficult, particularly in young children. The present study aimed to investigate the feasibility of subdural or epidural strips to record DSEPs during pedicle screw placement and surgery for TCS and SB.

METHODS

Five patients with SB/TCS and one patient with spondyloptosis and scoliosis, aged 4 months to 19 years, were enrolled. Surgeons placed a 1 × 4 strip for DSEP recordings either in the subdural space during surgery for TCS and SB (Fig 1), or in the epidural space during corrective spine surgery, just proximal to the surgical field. Surface electrodes used for stimulation were placed at the dermatomes of the level of sensory roots considered at risk. The minimally effective stimulus intensity ranged from 15 to 30 mA with a pulse width of 300–400 μs.

RESULT

Baseline DSEPs were successfully obtained and used for monitoring throughout the surgical procedures, except for one patient with lipomyelomeningocele (LMC), in whom DSEPs were first observed in the middle of lipoma removal and decompression and persisted till the end of surgery (Fig 2). This 6-month-old girl experienced improved motor function immediately after surgery, compatible with intraoperative electrophysiological findings. In a 19-year-old girl with spondyloptosis, the bilateral L5 DSEP disappeared, along with attenuation of motor evoked potentials (Fig 3), when the surgeon was performing the corrective procedure; she woke up with weakness in both lower limbs, which resolved 4 weeks later. In the remaining patients, DSEPs remained stable throughout the surgical procedures, with unchanged neurological status after operation. In this study, the amplitude of DSEPs ranged from 0.48 μV to 8.99 μV, and under most circumstances, an average of only 20–30 responses was necessary to obtain a monitorable DSEP.

CONCLUSION

The advantages of using subdural or epidural strips to record DSEP include the following:

1. The responses were larger compared to cortical DSEPs, probably owing to the larger recording surface areas of the strip and the shorter distance from the stimulating electrode to the recording electrode;
2. Subcortical DSEPs recorded just proximal to the surgical field are more resistant to anesthetic agents;
3. Less averaging was required to obtain a monitorable signal, which was less time-consuming.

Fig 1. A 1 × 4 strip for DSEP recordings was placed by surgeons in the subdural space during surgery for TCS and SB, just proximal to the surgical field.

Fig 2. Emergence of L5 DSEP (amplitude 3.57 μV, latency 11.8 ms) in the middle of lipoma removal and decompression (right) and persistence until the end of surgery in a 6-month-old girl with LMC, which successfully predicted immediate post-operative functional outcome, although there was still no monitorable cortical DSEP (left).

Fig 3. The amplitude of baseline DSEPs of the right L5 dermatome is 8.99 μV (upper) in a 19-year-old girl with spondyloptosis. The disappearance of DSEPs is observed when the surgeon performed the corrective procedure (lower).