Relationship of nerve stimulation current threshold to success of nerve block for post-operative analgesia

Author(s): Harshad Gurnaney, Arjunan Ganesh, Giovanni Cuchiarro.
Affiliation(s): Children's Hospital of Philadelphia, Philadelphia, PA

Introduction: The placement of successful peripheral nerve blockade depends on proximity of the needle to the nerve. However, the placement of the block needle too close to the nerve may result in a nerve injury, the nature of which remains controversial (1,2). The great majority of published studies recommend a current threshold lower than 0.5 mA. However, there is little evidence to support this current recommendation particularly when performing a peripheral nerve block under general anesthesia. There is no data in the pediatric population looking at stimulation threshold and success of blocks.

Methods: After obtaining Institutional Review Board approval, we reviewed the data of children who received a peripheral nerve block (PNB) between October 2002 and July 2006 at the Children's Hospital of Philadelphia by querying the departmental regional anesthesia database and hospital records. Only single injection nerve blocks were selected for in this analysis. Most of the peripheral nerve blocks were performed by fellows and residents under supervision of a group of regional anesthesia attendings. We determined the success and failure rate of femoral, sciatic, infraclavicular, interscalene nerve blocks and the correspondent current intensity used for the block. Blocks were considered to have failed when one could not detect any sensory blockade in the immediate postoperative period. Outcomes between the groups were compared with X^2 or Fisher's exact test for proportions.

Results: The analysis was conducted on 761 consecutive patients. We found that there was no correlation between the lowest current at which a muscle response was obtained and the success of peripheral nerve block. We performed subgroup analysis to see if there was a difference among the various nerve blocks. We did not find any association in these subgroups either.

Discussion: Based on the results of our study we believe that using a current threshold higher than 0.5 mA for obtaining a motor response is sufficient to provide a successful nerve block.

Table 1:

Total			
Current	Success	failure (%)	P value
≤ 0.5mA	436	16 (3.67)	
0.51-1.1 mA	292	15(5.14)	0.358
Femoral block			
≤ 0.5mA	218	6(2.75)	
0.51-1.1 mA	129	6(4.65)	0.367
Sciatic block			
≤ 0.5mA	136	7(5.15)	
0.51-1.1 mA	96	4(4.17)	0.741
Interscalene block			
≤ 0.5mA	53	1(1.89)	
0.51-1.1 mA	26	2(7.69)	0.267
Infraclavicular block			
≤ 0.5mA	25	2(8)	

0.51-1.1 mA	28	2(7.14)	1

References

1. Carles M. Anesth Analg 2001;92:194-8.
2. Choyce A, Chan VW. Reg Anesth Pain Med 2001;26:100-4.
3. Fanelli G. Anesth Analg 1999;88:847-52.