Neuraxial Blockade Reduces Postoperative Complications

Rodgers A, Walker N, Schug S, et al. Reduction of postoperative mortality and morbidity with epidural or spinal anaesthesia: results from overview of randomised trials. BMJ 2000;321:1–12.

Study Overview

Objective. To obtain reliable estimates of the effects of neuraxial blockade with either spinal or epidural anesthesia on postoperative mortality and morbidity.

Design. Meta-analysis.

Study selection. The researchers conducted a computerized search of electronic databases (Current Contents, MEDLINE, EMBASE, Cochrane Library) to identify trials in which patients were randomized to receive intraoperative neuraxial blockade or not. A trial's publication status, primary aims, or language did not affect eligibility for inclusion in the analysis. In addition, studies of adult populations were not excluded if neuraxial blockade groups also received general anesthesia, if general anesthesia groups received postoperative neuraxial blockade, or if there was more than one neuraxial blockade or general anesthesia group (in which case similar groups were combined for meta-analysis). Studies were excluded if they were not randomized, were quasi-randomized (eg, patients assigned according to date of birth), or if patient data were not available before 1 January 1997.

Main outcome measures. All-cause mortality, deep vein thrombosis, pulmonary embolism, myocardial infarction, transfusion requirements, pneumonia or other infections, respiratory depression, and renal failure.

Main results. 158 studies were identified as potentially eligible for the meta-analysis. Ten studies were excluded because they were quasirandomized, and 6 were excluded because not all subjects were randomized and separate information on the randomized patients was not available. The 141 remaining studies included 9559 patients. In each trial, a neuraxial blockade group and a non–neuraxial blockade group were identified. The neuraxial blockade group received no general anesthesia in 79 trials (56%) and received the same general anesthesia as the non–neuraxial blockade group in 37 trials (26%); in 22 trials (15%), the neuraxial blockade group received different general anesthesia than the non–neuraxial blockade group. Among the 56 studies for which follow-up data were available, mean length of follow-up was 62 days. Thirteen trials provided follow-up data beyond 30 days postoperatively. No adverse events were recorded in 80 trials, most of which were designed to assess endocrine, physiologic, and biochemical effects of neuraxial blockade.

A total of 247 deaths within 30 days of randomization were recorded in 35 trials. For 162 of these deaths, a specific diagnosis was available: 73 (45%) were due to pulmonary embolism, cardiac events, or stroke; 50 (31%) were due to infectious causes; and 39 (24%) were due to other causes. Overall mortality was about one third lower in the neuraxial blockade group (odds ratio [OR], 0.70 [95% confidence interval (CI), 0.54 to 0.90]; $P = 0.006$). This improvement in survival was related to trends toward reductions in deaths from pulmonary embolism, cardiac events, or stroke (OR, 0.73 [95% CI, 0.45 to 1.16]); infection (OR, 0.68 [95% CI, 0.39 to 1.21]); other causes (OR, 0.84 [95% CI, 0.44 to 1.61]); and unknown causes (OR, 0.64 [95% CI, 0.41 to 1.01). No significant difference was seen among patients grouped by type of surgery. In the neuraxial blockade group, about 1 fewer death per 100 patients occurred within 30 days after randomization. Mortality rates by type of anesthesia (ie, spinal or epidural) did not show a clear difference, but only 7 trials (involving 826 patients) compared them directly.

Measures of specific adverse events showed that neuraxial blockade reduced risk of deep vein thrombosis (DVT) by almost half (OR, 0.56 [95% CI, 0.43 to 0.72]). More than 80% of DVTs were reported in orthopedic trials. A total of 96 pulmonary emboli were recorded in 23 trials; 21 (22%) of these events were fatal. Overall, about half as many pulmonary emboli occurred in patients randomized to receive neuraxial blockade (OR, 0.45 [95% CI, 0.29 to 0.69]). In 30 trials, a total of 104 myocardial infarctions (MIs) were reported. About one third fewer MIs occurred in subjects receiving neuraxial blockade; however, CIs for this outcome were wide (0.45 to

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1.00). Only 42 strokes were reported in 8 trials, with similarly wide CIs (0.46 to 1.57). Risk of bleeding that required a blood transfusion of 2 units or more was reduced by half in patients randomized to neuraxial blockade (OR, 0.50 [95% CI, 0.39 to 0.66]). A lower risk of developing pneumonia was also seen in neuraxial blockade patients (OR, 0.61 [95% CI, 0.48 to 0.76]), as well as a 59% reduction in the odds of developing respiratory depression (OR, 0.41 [95% CI, 0.23 to 0.73]).

Conclusion

Neuraxial blockade can reduce postoperative mortality and other serious complications. The size of some benefits remains uncertain, and further research is needed to determine whether these positive effects were achieved solely because of neuraxial blockade and not partly because general anesthesia was avoided.

Commentary

Rodgers et al should be commended for this meta-analysis, which helps to resolve controversy surrounding neuraxial blockade. The researchers made great efforts to review all available literature, contacted study authors to verify data, and reviewed unpublished data to avoid publication bias. Moreover, Rogers and colleagues only used randomized trials and performed a good sensitivity analysis.

Some of the confidence intervals were relatively wide despite fairly large numbers of patients; as such, the results are not very precise. It would have been helpful if they had calculated the number needed to treat to better quantify the magnitude of the effects.

The reduction in DVT was achieved mainly in patients undergoing orthopedic surgeries; there were not enough patients in the other surgical groups to determine if such a reduction could be achieved in these patient groups as well. A previous study has shown a reduction in patients undergoing total knee arthroplasty [1]. When looking at mortality, it appears that the only group that had a definitive reduction in mortality was the orthopedic group; in other groups (general, urologic, and vascular), the confidence interval for the odds ratio crosses 1. Further studies will be needed to determine if mortality benefits from neuraxial blockade are as large and consistent in nonorthopedic surgeries. Additionally, as the authors point out in their discussion, it is unclear if observed reductions in morbidity and mortality are related to avoidance of general anesthesia or if they result from neuraxial blockade alone.

Applications for Clinical Practice

Use of neuraxial blockade should be considered in patients undergoing orthopedic procedures. For these patients, neuraxial blockade may reduce risk of complications including DVT, pulmonary complications, renal failure, infections, and mortality. The magnitude of effect in the general surgery group was not as evident; thus, neuraxial blockade cannot be definitively recommended for these procedures at this time.

References

1. Mitchell D, Friedman RJ, Baker JD 3rd, et al. Prevention of thromboembolic disease following total knee arthroplasty. Epidural versus general anesthesia. Clin Orthop 1991;(269):109–12.