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Routine needle aspiration for treating iatrogenic pneumothorax after cardiac electronic device implantation: a pilot study

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Topic(s):
Device Complications and Lead Extraction

Citation:
Background: Iatrogenic pneumothorax (PTX) is a well known complication of cardiac implantable electronic device (CIED) implantation that may prolong hospital stay and increase costs. In intervention-requiring cases, it is traditionally treated with the placement of a large-bore chest tube. For the management of primary spontaneous PTX, however, needle aspiration (NASP) has been shown to be similarly effective as chest drainage. Compared with chest tube placement, NASP is associated with less discomfort, pain, and shorter hospital stay.

Purpose: We hypothesised that, at least in a subset of patients, NASP may also be effective for treating iatrogenic PTX. Therefore, we compared the efficacy of the strategy of primary NASP with that of primary chest-tube thoracostomy.

Methods: In an observational pilot study we analysed data of 970 consecutive patients who underwent CIED implantation, upgrade, or revision with new subclavian venous access in our centre between January 2016 and June 2018. Of them 23 (2.4%) had PTX requiring intervention. Beginning with March 2017, traditional primary chest drain placement ("historic" control group, 9 cases) has been replaced by the novel "NASP first" strategy (14 patients). In cases with persistent PTX, thoracostomy has been performed secondarily. We estimated procedural success rates and length of hospital stay as efficacy outcome measures. Success rates were compared by Fisher's exact test, whereas length of hospital stay was evaluated as "time to event" by Kaplan-Meier analysis. Hazard ratios (HRs) were calculated using univariable Cox modelling (given the groups were similar and the small sample size did not allow the use of multivariable techniques). Besides intention to treat (ITT) and per protocol (PP) analyses, we also investigated the effect of secondary chest drain placement (i.e., NASP failure) on discharge timing.

Results: Demographic, clinical, and procedural characteristics of the two treatment groups were comparable. Out of 14 attempts, NASP was successful in 8 cases [57.1%, 95% confidence interval (CI): 28.9% to 82.3%], whereas PTX resolved in all patients after chest drain insertion (9/9=100%, 95% CI: 66.4% to 100.0%, p=0.048). As to length of hospital stay, ITT analysis showed no difference between the two approaches: HR for longer hospitalization (chest drain / NASP) was 1.2, 95% CI: 0.5 to 2.8, p=0.75. In contrast, PP evaluation revealed greater risk of prolonged hospital stay for primary chest-tube thoracostomy patients than for successful NASP cases: HR=4.8, 95% CI: 1.5 to 14.8, p=0.007. Moreover, failure of NASP did not result in a meaningful delay in discharge timing as HR (chest drain / NASP) was 0.4, 95% CI: 0.1 to 1.5, p=0.16.

Conclusion: Our pilot data suggest that in a considerable number of patients iatrogenic PTX may be successfully treated with NASP resulting in less discomfort and shorter hospitalization without the risk of significant discharge delay in unsuccessful cases.
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