

**Title:** VENTRICULAR ARRHYTHMIAS DURING PULMONARY ARTERY CATHETERIZATION IN THE INTENSIVE CARE UNIT: A PROSPECTIVE STUDY

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**Introduction:** The occurrence of advanced ventricular arrhythmias (VA) is one of the most common complications of pulmonary artery catheter (PAC) insertion. Attempts at decreasing the risk of VA remains controversial (1-3). The risk of PAC induced VA may be related to the time required for catheter insertion. Three recent prospective studies have demonstrated PAC times ranging from 20 to 40 +/- 5 minutes, and an incidence of PAC induced VA of 25-68% in ICU patients (1,4,5). We undertook a prospective study of all patients undergoing PAC in a surgical ICU to determine the incidence of PAC induced VA, time of insertion, and to evaluate the incidence of VA that required lidocaine therapy.

**Methods:** Fifty-six patients requiring PAC were prospectively studied (36 men and 20 women, mean age 69.8 +/- 11 years). The indications for PAC were sepsis (10), cardiogenic shock (8), hypovolemic shock (12), respiratory failure (2), preoperative evaluation (20) and miscellaneous (4). All PAC were inserted into either the subclavian or internal jugular vein, with catheterization time being defined as the time required to obtain a wedge pressure from the initial insertion of the PAC into a central vein. PAC position was confirmed by X-ray. The EKG was continuously monitored using both a cardiac monitor and a permanent recording of a rhythm strip on a separate EKG recorder. The permanent tracing was independently interpreted by two of the authors. VA's were defined as 3 or more consecutive PVC's. All PAC were inserted by PGY2-3 anesthesia or surgery residents under the direct supervision of an ICU attending. All were familiar with PAC insertion and were specifically instructed to administer IV lidocaine if the VA's did not respond to PAC movement or if the VA lasted more than a few seconds. The residents were unaware of a lidocaine study. The results were computer analyzed, and were evaluated using the students t-test in case 2 sample comparisons, and through analysis of variance for more than two groups.

**Results:** Adequate wedge tracings were obtained in all 56 patients without fluoroscopic guidance. The mean PAC time was 175.9 +/- 263.2 seconds (range 27.0-1200 secs). Seven patients (12.5%) had one or more runs of VA, the longest being a run of 16 beats lasting 7 seconds. There were no new right bundle branch blocks or other complications. The PAC time was longer for the group of patients with arrhythmias than for those without VA (311.0 +/- 407.4 secs versus 156.6 +/- 235.7 secs), but the difference was not statistically significant. There was no

correlation between VA occurrence and the age or underlying condition of the patients. All VA's resolved spontaneously or upon catheter movement. No patient required lidocaine.

**Discussion:** This study demonstrates that PAC insertion can be performed in critically ill ICU patients with a significantly lower incidence of VA than has previously been reported. We believe that the best explanation for this is in the markedly reduced PAC insertion time. A prolonged catheterization time is likely to be more traumatic and seems capable of overwhelming the antiarrhythmic properties of lidocaine. The VA in our study were short, self-limited or were always corrected by moving the catheter. Other investigators have found lidocaine prophylaxis effective if catheterization time was "short" (less than 20 minutes), and ineffective beyond 20 minutes insertion time. Our study shows that if the catheterization time is reduced well below 20 minutes, that the use of lidocaine, although potentially effective, appears unnecessary. A greater emphasis should be placed on adequate supervision of PAC insertion by trained intensivists and on the shortening of the transit time of the catheter through the right ventricle. Lidocaine should be reserved for the treatment of VA's not resolving quickly upon moving the catheter.

#### References:

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