TITLE: TEACHING CENTRAL VENOUS CANNULATION OF PEDIATRIC PATIENTS

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A major responsibility of clinical faculty is to provide educational experience for resident physicians without compromising the level of patient care provided nor increasing the risk of morbidity. The teaching of a technical skill offers a situation in which the educational experience and its morbidity can be documented.

Methods:

A technique and equipment for central venous cannulation in pediatric patients was developed and performed by three staff anesthesiologists in approximately 100 patients over a 9 month period.[1] These same faculty then taught resident anesthesiologists in a one on one setting. All patients of the three staff members needing a central venous catheter were included in the study. The teaching phase included 15 clinical rotating residents (2-4 months pediatric experience) and 18 fellows (6 months-1 year pediatric experience). Residents were randomly assigned to patients by an anesthesiologist not involved in the study. No patient was excluded from resident participation. All initial attempts were via the high cervical approach to the right internal jugular vein.[1] Failure there resulted in the use of alternate approaches which included right low cervical, external and left internal jugular veins and on one occasion the subclavian vein. The following observations were recorded: name of staff and resident, age of patient, route attempted, success/failure, and complications. Data were analyzed for statistical significance by chi-square and t test for unpaired data where appropriate with $p<0.05$ considered significant.

Results:

All data of central venous cannulation by the three staff anesthesiologists alone[1] is compared to the present data of central venous cannulation by supervised residents. Success/Failure and average age of patients are summarized in Table I. Although resident success (72%) was less than staff (83%) no statistical difference was demonstrable. Second attempts increased the percentage of patients successfully cannulated in both groups. No age difference between groups was found by statistical analysis. Complications and average age of patients are summarized in Table II. The only complication encountered was puncture of the carotid artery which was managed by 5 minutes of non-occlusive compression. Occasionally there was a small clinically insignificant hematoma and no sequelae in the perioperative period. No other hemodynamic or neurologic sequelae were seen up to the time of discharge from the hospital. The average age of patients with this complication was lower in the resident group but was not statistically significant. In both groups 96+% of patients were successfully cannulated.

Summary:

The ultimate percentage of patients successfully cannulated was not affected by supervised residents performing the procedure compared to staff alone. Neither resident participation nor age of patients affected either success/failure or morbidity in this study. Periodic review of such data can serve to monitor performance of this technical skill in a teaching/learning experience.

TABLE I

RESULTS OF STAFF AND SUPERVISED RESIDENT PERFORMANCE

	STAFF ALONE	SUPERVISED RESIDENT
Number of Patients	71	61
Age Range of Study Patients (Mean)	1 day-19 years (7.3 years)	1 day-18 years (6.1 years)
Age of Patient in Failed Attempts (Mean)	7.2 years	5.8 years
Success Initial Approach (Right Int. Jug. Vein)	59 (83%)	44 (72%)
Plus Staff Attempt when Resident Failed (Same Location)	_____	57 (93%)
Plus Alternate Location	68 (96%)	59 (97%)

TABLE II

COMPLICATIONS DURING STAFF AND SUPERVISED RESIDENT ATTEMPTS

	STAFF ALONE	SUPERVISED RESIDENTS
Carotid Artery Punctures Per Patients	6 (8.5%)	4 (6.6%) (Resident Alone)
		6 (9.8%) (Includes Staff Follow-Up Attempts)
Age Carotid Puncture (Mean)	7.2 years	3.3 years (Resident)

Reference:

1. Coté, C.J., Jobes, D.R., Schwartz, A.J., Ellison, N: Two approaches to internal jugular vein cannulation in children-a comparative study. Accepted for publication in Anesthesiology, 1979.