Selected Summaries

Increasing Yields From Blood Cultures

[Isaacman DJ, Karasic RB, Reynolds EA, Kost SI. Effect of number of blood cultures and volume of blood on the detection of bacteremia in children. } Pediatr 1996,128:190-195.]

The optimal number of blood cultures and volume of blood needed to detect bacteremia in children is not known. Because of inherent difficulty in obtaining blood from children, clinicians often rely on a single culture using as little as 1 ml of blood to test for bacteremia. This study was designed to determine whether bacteremia can be detected more rapidly and completely by obtaining two blood cultures and/or collecting larger volume of blood. Three hundred children between 3 and 36 months of age having fever, with a temperature higher than 39.5°C and/ or clinical toxicity were prospectively enrolled. Those who had received systemic antibiotics in the 48 hours preceding study entry, or had a history of severe skin disease or hypersensitivity to iodophors or those who required immediate intravenous access (before notification to the investigator) were excluded from the study. Each patient had two samples of blood obtained sequentially from separate sites. Sample A, containing 2 ml of blood was inoculated in the standard manner into aerobic and anaerobic culture bottles (1 ml per vial). Sample B was divided into 3 aliquots; Bl (2 ml) was inoculated into one set of culture bottles (1 ml per vial), B2 (6 ml) was inoculated into another set of culture bottles (3 ml per vial), and ISO(1.5 ml) which was injected into an isolator tube and then quantitatively plated into semisolid media.

A pathogen was isolated from one or more cultures in 30 patients (10% of the cases). In 13 children (43%), the pathogen was isolated with all of culture methods tested (concordant cases) and in 17 patients (57%) one or more of culture yielded no growth (discordant cases). Out of a total of 1090 cultures obtained, 19 (1.7%) yielded contaminants. When measured at 24 hours, the pathogen recovery rate for the B2 sample (72%) was higher than that for individual small volume samples (A=37% and Bl=33%, $p < 0.01$ for each comparison) and for combination of the two small volume samples (A + Bl=47%, p=0. 04). At final (7 day) reading the pathogen recovery rate for B2 sample (83%) was higher than that for Bl (60%, p=0.02) and similar to the recovery rate observed with the combination of the two small volume cultures (A + Bl=73%, p=0.55). It was concluded that increasing the volume of blood inoculated into blood culture bottles improves the timely detection of bacteremia in pediatric patients.

Comments

The standard practice for diagnosing bacteremia in adults is to obtain two or more blood culture specimens containing a minimum of 10 ml of blood per bottle. The findings of this and an earlier study(l) indicate that collecting a single small volume of sample for blood culture will miss a significant proportion of children with bacteremia.

In the present study, the collection of a relatively large sample of blood (3 ml per bottle) improved the detection of bacteremia with a marked increase in

sensitivity at 24 hours. The contamination rate in the large volume samples was similar to that in the small volume samples and were lower than contamination rates noted by other authors(2). Scrupulous skin cleaning was probably the most important factor in reducing contamination.

The study had some limitations. It was conducted in Emergency Room and primarily involved children with high fever and no localizing signs; the findings could not be generalized to other clinical situations(3).

In conclusion, due consideration should be given to the volume of blood collected for culture in a child with suspected bacteremia, before labelling the case as culture negative. About 2-3 ml blood should preferrably be injected in the bottle containing 30 ml of media.

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