



ORIGINAL

Blood culture differential time to positivity enables safe catheter retention in suspected catheter-related bloodstream infection: a randomized controlled trial



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PALABRAS CLAVE

Bacteriemia associada a catèter;
Diagnòstic;
Catèter venos central;
Cuidados intensivos

Abstract

Objective: To evaluate the clinical usefulness and safety of the differential-time-to-positivity (DTP) method for managing the suspicion of catheter-related bloodstream infection (CR-BSI) in comparison with a standard method that includes catheter removal in critically ill patients.

Methods-Design: A prospective randomized study was carried out. Setting: A 16-bed clinical-surgical ICU (July 2007-February 2009). Interventions: Patients were randomly assigned to one of two groups at the time CR-BSI was suspected. In the standard group, a standard strategy requiring catheter withdrawal was used to confirm or rule out CR-BSI. In the DTP group, DTP without catheter withdrawal was used to confirm or rule out CR-BSI. Measurements: clinical and microbiological data, CR-BSI rates, unnecessary catheter removals, and complications due to new puncture or to delays in catheter removal.

Results: Twenty-six patients were analyzed in each group. In the standard group, 6 of 37 suspected episodes of CR-BSI were confirmed and 5 colonizations were diagnosed. In the DTP group, 5 of 26 suspected episodes of CR-BSI were confirmed and four colonizations were diagnosed. In the standard group, all catheters (58/58, 100%) were removed at the time CR-BSA was suspected, whereas in the DTP group, only 13 catheters (13/41, 32%) were removed at diagnosis, and 10 due to persistent septic signs (10/41, 24%). In cases of confirmed CR-BSI, there were no differences between the two groups in the evolution of inflammatory parameters during the 48 hours following the suspicion of CR-BSI.

Conclusions: In critically ill patients with suspected CR-BSI, the DTP method makes it possible to keep the central venous catheter in place safely.

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KEYWORDS

Catheter-related infections;
Diagnosis;
Central venous catheter;
Critical care

La diferencia del tiempo de positivización de hemocultivos permite la retención segura del catéter en pacientes con sospecha de bacteriemia asociada a catéter: un estudio controlado y aleatorizado

Resumen

Objetivo: Evaluar la utilidad clínica y la seguridad de la diferencia del tiempo de positivización (DTP) de hemocultivos en el manejo de la sospecha de bacteriemia asociada a catéter (BAC) comparándola con un método estándar que incluye la retirada de catéter en los pacientes de cuidados intensivos.

Métodos-diseño: Estudio prospectivo aleatorizado. Ámbito: UCI médico-quirúrgica de 16 camas (julio de 2007-febrero de 2009). Intervención: aleatorización en 2 ramas de los pacientes en el momento de la sospecha de BAC. Grupo estándar: estrategia clásica que requiere la retirada de catéter para descartar o confirmar la BAC; grupo DTP: método DTP sin retirada de catéter que confirma o descarta la BAC. Variables: datos clínicos y microbiológicos, tasas de BAC, recambios innecesarios de catéteres, complicaciones debidas al recambio de catéter o al retraso en el recambio de catéter.

Resultados: Veintiséis pacientes fueron estudiados en cada grupo. En el grupo estándar 6 de los 37 episodios de sospecha de BAC fueron confirmados y 5 colonizaciones de catéter fueron diagnosticadas. En el grupo DTP 5 de los 26 episodios de BAC fueron confirmados y 4 colonizaciones diagnosticadas. En el grupo estándar todos los catéteres (58/58, 100%) se retiraron en el momento de la sospecha de BAC, mientras que en el grupo DTP solo 13 catéteres (13/41, 32%) se retiraron en el momento del diagnóstico y 10 por persistencia de signos inflamatorios (10/41, 24%). En los casos de BAC confirmada no se encontraron diferencias en la evolución de los parámetros inflamatorios en las 48 h que siguieron la sospecha de BAC.

Conclusiones: En los pacientes críticos con sospecha de BAC el método DTP permite mantener los catéteres venosos centrales de forma segura.

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Introduction

Catheter-related bloodstream infections (CR-BSI) are the most common type of nosocomial bloodstream infections; CR-BSI increase length of stay and morbidity, thus resulting in higher healthcare costs of care¹.

Central venous devices are very common in the management of patients in intensive care units (ICU). Clinical suspicion of CR-BSI often requires catheter withdrawal and replacement because a definitive diagnosis can only be reached retrospectively by finding that blood cultures and catheter tip culture are positive for the same pathogen. However, suspected CR-BSI is finally confirmed in only 15% to 25% of withdrawn catheter².

For this reason, several diagnostic methods (quantitative blood cultures, differential time to positivity, endoluminal brush, etc.) that do not require catheter withdrawal have been tested in recent years. The differential time to positivity (DTP) of blood cultures has been validated as an accurate diagnostic method of diagnosing CR-BSI that avoids unnecessary catheter withdrawal³⁻¹⁰. DTP is based on the presumption that if the infection originates in the catheter, the blood from the hub will have a higher bacterial load than in the peripheral blood. Therefore, cultures of blood obtained from the catheter hub will become positive faster than those obtained from peripheral blood.

In a previous study, we found the DTP method yielded 80% sensitivity, 99% specificity, 92% positive predictive value, and 98% negative predictive value compared with quantitative

and semiquantitative cultures of the tip of the withdrawn catheter⁴.

In the current randomized study, we aimed to evaluate the clinical usefulness and safety of the DTP method of managing suspicion of CR-BSI in critically ill patients.

Material & methods**Study design**

We conducted a prospective randomized trial, assigning patients with suspected CR-BSI to one of two groups:¹¹

- DTP group, in whom the DTP method was used to diagnose CR-BSI without catheter withdrawal.
- Standard group, in whom quantitative and semiquantitative cultures of catheter tips requiring catheter withdrawal were used to diagnosis CR-BSI.

We hypothesized that using the DTP method to manage suspicion of CR-BSI in critically ill patients would allow the CVC to remain in place safely (i.e., without increasing morbidity and mortality due to delay in catheter withdrawal in cases of confirmed CR-BSI), thus avoiding unnecessary catheter replacement.

The primary outcome measure was reduction in the number of catheters withdrawn. Secondary outcome measures were morbidity and mortality due to delayed catheter

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