AUTOMATIC MIXING AND HEMOLYTIC BLOOD SPECIMENS

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ABSTRACT :

Wiwanitkit V. Automatic Mixing and Hemolytic Blood Specimens. (Region 4 Medical Journal 2000 ; 19(1) : 21-24).

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Although the automatic blood agitation machine was used for years in Thailand, there is no report about its efficacy. Therefore, a retrospective analytic study to analyze the risk of hemolysis in using automatic blood agitation machine was performed. A total of 14,682 blood specimens sent to Clinical Chemistry Unit, Division of Laboratory Medicine, King Chulalongkorn Memorial Hospital during the year 1998 was studied. The results revealed that the automatic agitation increased the risk of hemolysis (Odds ratio = 6.18, 95% Confidence interval = 4.27 - 8.93). Therefore, suggestion to use manual mixing is recommended.

บทคัดย่อ :

วิโรจน์ ไววานิชกิจ. การผสมตัวอย่างเลือดด้วยเครื่องอัตโนมัติ และการแตกตัวของเม็ดเลือด. (วารสารแพทย์เขต ๔ ๒๕๔๓ ; ๑๙(๑) : ๒๑-๒๔).

ภาควิชาเวชศาสตร์ชันสูตร คณะแพทยศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย, กรุงเทพมหานคร.

แม้ว่าจะมีการผสมตัวอย่างเลือดเพื่อการส่งตรวจทางห้องปฏิบัติด้วยเครื่องผสมเลือดอัตโนมัติมาเป็นเวลานาน แต่จากการทบทวนวรรณกรรมไม่พบการศึกษาถึงประสิทธิภาพของหัตถการชนิดนี้ในประเทศไทย จึงได้ทำการศึกษาเชิงวิเคราะห์แบบย้อนหลังเพื่อประเมินความเสี่ยงของการแตกของเม็ดเลือดแดงจากการผสมตัวอย่างเลือดด้วยเครื่องอัตโนมัติ โดยได้ทำการศึกษาจากตัวอย่างเลือดที่ส่งตรวจยังห้องปฏิบัติการเคมีคลินิก แผนกเวชศาสตร์ชันสูตร โรงพยาบาลจุฬาลงกรณ์จำนวน ๑๔,๖๘๒ ตัวอย่าง ผลการศึกษาพบว่าการผสมตัวอย่างเลือดด้วยวิธีดังกล่าวเพิ่มความเสี่ยงของการแตกตัวของเม็ดเลือด (Odds ratio = ๖.๑๘, ๙๕% Confidence interval = ๔.๒๗-๘.๙๓) ทั้งนี้จึงควรพิจารณาใช้การผสมตัวอย่างเลือดด้วยมือ (manual) มากกว่าการใช้เครื่องอัตโนมัติ

Hemolysis is a totally unwanted event in specimen collection.[1-6] Hemolysis can cause spurious laboratory results. An important cause of hemolysis is action force from mixing procedure.[4] Concerning the principle that good laboratory result cannot come from improper specimens. And any errors in specimen presentation result in waste of time and money.[7] Therefore, the mixing procedure used should produce no improper specimens.

In the present day, the two major mixing methods are automatic and manual mixing. Automatic blood mixing machine is the new machine produced to help medical personnel in specimen preparation. Although this method has been used in Thailand for years, from review literature, no report about quality of specimen yielded from this mixing procedure in Thailand setting was found. Therefore, this study was set to identify the risk of hemolysis in using this method. Results from this study can be a good basic information in selection of proper mixing procedure for laboratory service in Thailand.

Methods and materials

This study was set as a retrospective analytical study. Total 14,682 blood specimens sent to Clinical Chemistry Unit, Division of Laboratory Medicine, King Chulalongkorn Memorial Hospital during the year 1998 was studied. Non hemolytic specimens were set as control group and hemolytic were set as case group. All data of the specimens in laboratory records were reviewed, collected and analyzed. Analytical statistical analysis was used. $P < 0.05$ was accepted as statistical significant.

Results

From a total of 14,682 specimens, there were only 23 hemolytic specimens (0.15%) yielded from mixing. Odds ratio of hemolytic specimens from manual agitation was 6.18 (95% Confidence interval = 4.27 - 8.93) (Table 1). Chi-square between mixing and hemolysis was 24.41 ($P < 0.005$).

Table 1 Specimens included in this study.

	Automatic mixing	Manual mixing	total
Hemolysis	13	10	23
Not hemolysis	2,549	12,110	14,659
Total	2,562	12,120	14,682

* Odds ratio = 6.18, 95% confidence interval = 4.27 - 8.93, $X^2 = 24.41$, $P > 0.5$

Discussion

Mixing procedure is a very important step of blood collection especially in case that anticoagulant-added blood collection tubes are used.[1-4] Well mixing of specimen to produce homogenicity of blood sample is essential for obtaining accurate results for analysis. Although automatic blood mixing machined has been used for years in Thailand but there is no report about its effectiveness.

From this study, there are only a few valid percentages of improper hemolytic specimens found. Odds ratio from retrospective analysis revealed that automatic agitation of blood specimen let high risk of hemolysis.

These results can imply that using automatic machine increases the risk of hemolytic specimen. As for the study of Folea G, et al.,[8] which stated that no significant advantage could be expected from the use of manual as compared to automatic blood agitation, therefore, it is better to use the manual agitation.

Suggestion to use manual mixing procedure is advised due to the fact that it requires no specific equipment. Furthermore, using automatic blood agitation must have to manage the problem of transport and battery loading.[8] Therefore, manual blood agitation procedure should be taught and trained for all medical personnel to use influence and correctly. It is suitable with the health economics of Thailand in the present day.

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