Haemolysis rate - comparison between S-Monovette® and vacuum systems

The following chart shows the percentage of haemolysed samples in selected studies. In direct comparison of the vacuum blood collection system with our gentle aspiration technique the haemolysis rates could be significantly reduced.

	Vacuum system	S-Monovette®	Difference
Cantonal Spital Fribourg / Schweiz Millius et al Pract Lab Med 2021; 27:e00252 The "EPiQ"-Study (Evaluation of preanalytical quality): S-Monovette® in manual aspiration mode drastically reduces hemolytic samples in head-to-head study	17 %	4,3 %	12,7 %
Klinik für Forschung Istanbul / Türkei Kazezoglu et al Clin Lab 2019; 65(1)	14,7 %	4,4%	10,3 %
Universitätsklinik Parma / Italien Lippi et al Clin Biochem. 2013; 46(7-8):561-564 Prevention of hemolysis in blood samples collected from intravenous catheters	29 %	2 %	27 %

Savings from reduced haemolysis rates

Studies* show that gentle aspiration of the blood is THE technique of choice: The S-Monovette® system guarantees lower haemolysis rates compared to vacuum systems.

In particular, laboratory values are distorted by haemolytic samples and can necessitate re-sampling. The S-Monovette® system can reduce the haemolysis rate, which provides decisive benefits:

- ✓ Reduced time and personnel expense
- ✓ Reduction in material costs
- ✓ No additional reagent costs

→ reduced process cost

Do you have any questions?

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The “EPiQ”-Study (Evaluation of preanalytical quality): S-Monovette® in manual aspiration mode drastically reduces hemolytic samples in head-to-head study

Pract Lab Med. 2021 Jul 28;27:e00252. DOI: 10.1016/j.plabm.2021.e00252

Laura Millius, Erwin Riedo, Thierry Caron, Juliette Belissent, Benoît Fellay, Vincent Ribordy , Jean-Luc Magnin

Abstract

Background

Hemolytic blood samples are the number one cause for specimen rejection at emergency departments. Triggered by unsuitable blood sampling material or incorrect handling and a related strong vacuum force, hemolytic samples often must be retaken. The objective of this study was to assess whether correct manual aspiration using S-Monovette® could reduce the number of hemolytic samples.

Methods

Between January and April 2019, a head-to-head study was conducted. Whereas in the first eight weeks, all specimens were collected using Vacutainer®, in the second eight weeks, blood was taken using S-Monovette® in aspiration mode. Specimens were categorized into five classes (0-30, 31-50, 51-75, 76-100, and 101+ mg/dl of cell-free hemoglobin) and for the statistical analyses, all samples exceeding 30 mg/dl were classified as hemolytic.

Results

Data were collected on 4794 blood specimens (Vacutainer®: 2634 samples, S-Monovette®: 2160 samples). While the percentage of non-hemolytic samples (HI of 0-30 mg/dl) was substantially higher for specimens drawn by S-Monovette® (95.7 %) than Vacutainer® (83.0 %), the opposite was true for all HI categories above 30 mg/dl. Importantly, the reduction of hemolytic samples took place immediately following the imposition of S-Monovette® and remained stable at a low level until the end of the study.

Conclusions

Based on our results, we conclude that switching to S-Monovette® in manual aspiration mode in the blood sampling process could be highly beneficial, not only from a financial point of view, but also with regards to reducing unnecessary tasks and stress for nursing staff and improving patient outcome overall.

The Effect of Different Blood Drawing Methods on Hemolysis and Test Results from Intravenous Catheters Used in Emergency Departments

Clin Lab. 2019 Jan 1;65(1). DOI: 10.7754/Clin.Lab.2018.180614:

Cemal Kazezoglu, Erdinc Serin

Abstract

Background

Hemolysis is frequently reported in samples sent from emergency departments. In our study we aimed to compare the influence of invitro hemolysis on test results and hemolysis ratios of different blood drawing techniques (aspiration method and vacuum filling technique) used to draw blood from intravenous (IV) catheters in Emergency Department. Two techniques (aspiration vs. vacuum filling) used to draw blood into three different tubes (Sarstedt S-Monovette® 4.9 mL Serum Gel tube, BD 5 mL Vacutainer® Rapid Serum Tube (RST), and 5 mL Vacutainer® SST™II tube) and evaluated the effect of the hemolysis index of the sera on the tests analyzed.

Methods

In the emergency department blood was drawn from 128 consecutive patients into Sarstedt S-Monovette® 4.9 mL Serum Gel tubes using aspiration technique and also into BD 5 mL Vacutainer® Rapid Serum Tubes (RST) and 5 mL Vacutainer® SST™II tubes using vacuum filling technique. All the tests requested from the patients were analyzed on all tubes and the hemolysis index of all the tubes were also evaluated.

Results

As a result, the percentage of hemolysis encountered in S-Monovette® vs. SST and S-Monovette® vs. RST was 4.41% vs. 14.71% and 0% vs. 18.97%, respectively ($p < 0.001$, $p < 0.001$). In addition to this, the mean values of the test results for each assay in S-Monovette® tubes showed a significant difference when compared to RST and SST ($p < 0.01$). CKMB and LDH test results found in the tubes filled using the aspiration techniques (S-Monovette®) were statistically significantly lower than the results gathered from the tubes filled using vacuum filling technique (Vacutainer® RST and Vacutainer® SST) ($p < 0.001$).

Conclusions

The test results and HI taken from the aspiration method seemed to be more reliable despite the presence of hemolysis.

Prevention of hemolysis in blood samples collected from intravenous catheters

Clin Biochem. 2013 May;46(7-8):561-4. DOI: 10.1016/j.clinbiochem.2013.01.021

Giuseppe Lippi, Paola Avanzini, Gianfranco Cervellin

Abstract

Background

Samples drawn through intravenous catheters are frequently hemolyzed. We planned a prospective, randomized study to establish whether hemolysis in samples drawn from intravenous catheters may be reduced using S-Monovette® tubes collected by manual aspiration as compared with standard vacuum tubes.

Design and methods

We studied 52 consecutive patients admitted to the ED. Blood was drawn through a 20-gauge intravenous catheter. A 5.0mL, Becton Dickinson Vacutainer® SST II Plus serum tube was collected and discarded. In the odd group of patients (i.e., n. 1, 3, 5, etc.), a second SST II tube was drawn with vacuum ("BD-V"), followed by a 5.5mL S-Monovette® serum tube collected with manual aspiration ("SD-A") and an identical S-Monovette collected by vacuum ("SD-V"). In the pair group of patients (i.e., n. 2, 4, 6, etc.), the sequence was modified to "SD-A", "SD-V" and "BD-V". Serum was separated and tested for lactate dehydrogenase (LDH), potassium and cell-free hemoglobin.

Results

The mean concentration of potassium (+2.7% in BD-V and +1.7% in SD-V, respectively), LDH (+15% in BD-V and +7% in SD-V, respectively) and cell-free hemoglobin was significantly increased when samples were collected with vacuum tubes as compared with manual aspiration. No significant differences were observed between SD-V and BD-V. The frequency of hemolyzed samples was higher when blood was collected with the vacuum as compared with SD-A (i.e., 2%), but did not differ between BD-V and SD-V (i.e., 29 versus 31%; p=0.70).

Conclusions

S-Monovette® can be used with vacuum or aspiration collection. This latter approach allows blood drawing with limited shear stress and less likelihood of generating spuriously hemolysis.