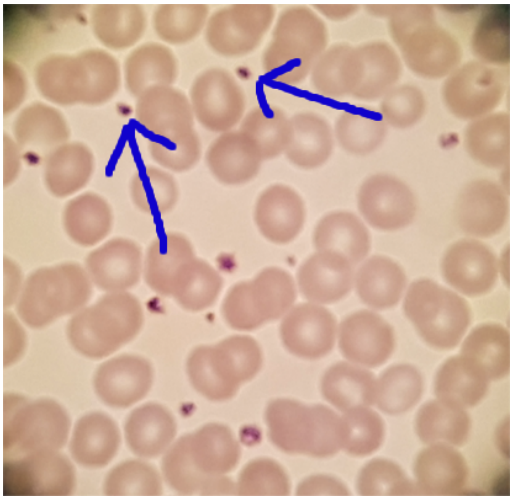
Platelet Clumping

Last update 1 January 2021

Overview

I'll take it as read that we all know what platelets are and what they do…



Platelet counts in the reference range don't usually give us too much trouble in reporting, even if some clumping is present, mainly because they are "normal". Adequate platelet counts fall within a typical reference range of about 150- 450 x 103/µL.

If there are instrument flags for a platelet abnormal scattergram or platelet clumps, repeat counting by another method is advisable. Most initial platelet counts are performed by impedance counting, but many analyzers can also count platelets by optical/fluorescent techniques.

However all techniques have their limitations

With impedance counting, very small red cells and red cell fragments may be counted as platelets; giving a wrongly increased platelet count.

With optical counting, large platelets may be counted as red cells giving a falsely decreased count.

Some analyzers use impedance and optical counts and also feature fluorescent platelet counts which use a platelet specific dye thereby providing accurate platelet counts without the interferences of other methods.

Given a "normal" platelet count, even with clumping seen on a smear, all is clinically well. We have a "normal" result.

Thrombocytopenia however is a different matter. Given thrombocytopenia an accurate count is vital to diagnose, treat and monitor patients. Even a small increase or decrease can be significant when there is a severe thrombocytopenia. With fewer platelets, every platelet counts!

It can be dangerous to miss true thrombocytopenia but is also dangerous to report a low platelet count in a patient with a spurious thrombocytopenia who is not actually thrombocytopenic.

One of the first questions we must ask with an apparent thrombocytopenia is if this is a true thrombocytopenia or not. A true thrombocytopenia represents a patient with a low platelet count who may need monitoring or medical intervention. A false one does not, and should not be treated as such

So... with this in mind

I had this case a couple of years ago

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LORCA Gabriel              M0000000          09.01.55 M CDU
X,18.0009127.Z          22.01.18  Clinical details  acute diverticulitis

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            HBM    WBCM     PLT     HCT    RBCM    MCVM    MCHM   MCHCM     RDW       N
161110     15.1    8.20     175   0.482    5.02    96.0    30.1    31.3    12.5    6.09
110915      159    6.90     186   0.473    5.32    88.9    29.9     336    12.9    4.00
200118 F    157   18.79     167   0.457    5.14    88.9    30.5     344    12.5   16.76
220118 F    136    7.78      83   0.406    4.52    89.8    30.1     335    12.4    6.49

              L       M       E       B     NUC    NUCA     ESR      GF
161110     1.35    0.54    0.20    0.02
110915     2.00    0.60    0.20    0.00
200118 F   0.84    1.17    0.00    0.02
220118 F   0.82    0.28    0.17    0.02
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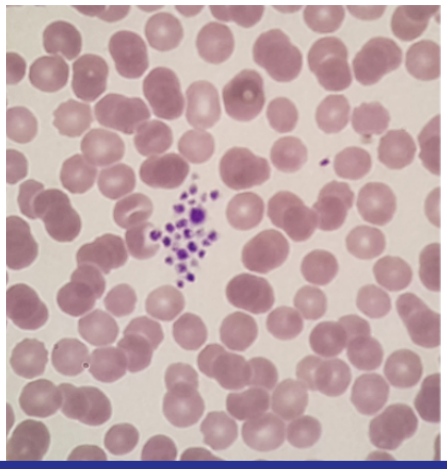
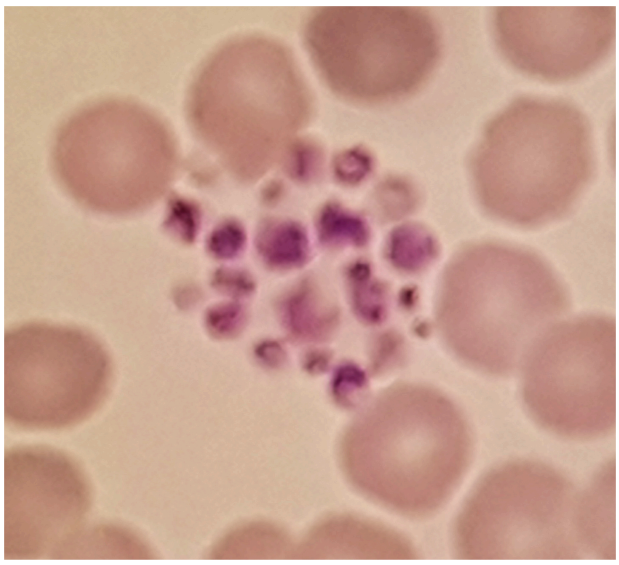


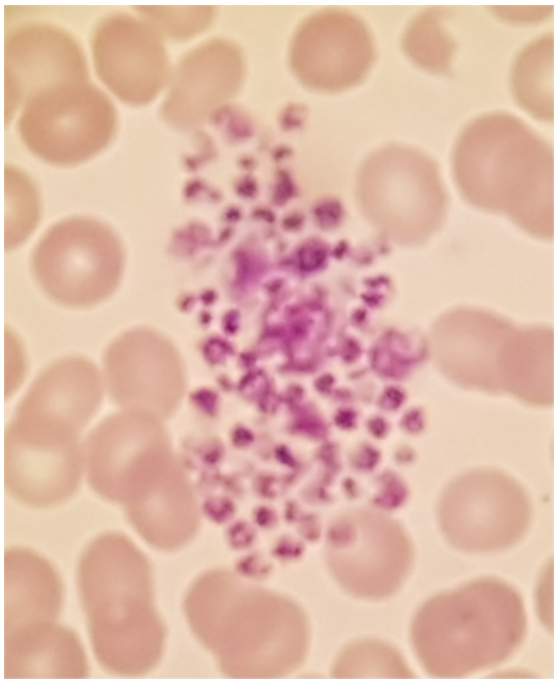
Look at that platelet count. Half of what it has been previously. Microscopy revealed why.That result wasn't correct. The platelet count wasn't reduced at all; because the platelets were

clumped the analyser wasn't able to count them. Platelet clumping causes a falsely decreased automated platelet count and so in such a case no result can be issued for a platelet count



That result of 83 wasn't correct. The platelet count wasn't reduced at all; because the platelets were clumped the analyser wasn't able to count them. Platelet clumping causes a falsely decreased automated platelet count and so in such a case no result can be issued for a platelet count Platelet clumping is a relatively common laboratory finding. In my experience I see it on a daily basis.

It can have a range of causes:



It is commonly caused by platelet activation due to traumatic venepuncture. Such instances are transient, subsequent samples giving reliable platelet counts.

Another common cause is underfilling or overfilling of sample bottles leading to partially clotted samples.

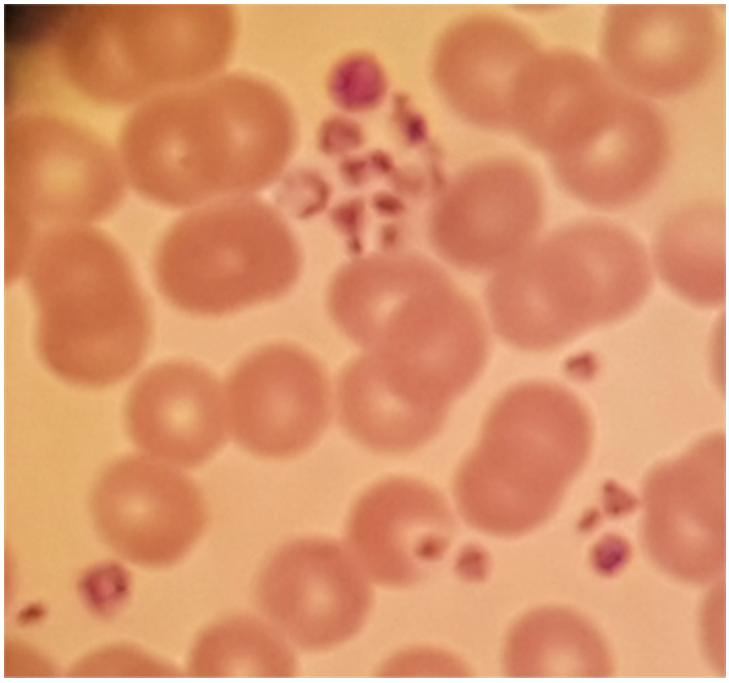
It can also be caused by cold-reacting autoantibodies.

It is less commonly caused by EDTA-dependent antibodies that react with platelet glycoprotein IIb/IIIa.

Other reported causes include multiple myeloma, infections, anticardiolipin antibodies, high immunoglobulin levels, abciximab therapy.

So…. What do we do to resolve the issue and to be able to issue a reliable platelet count?

Given a previous result in the reference range an correctly filled repeat sample taken without excessive trauma and brought directly to the laboratory without delay may well resolve the issue.



As is the case with red cell autoagglutination warming the sample can reverse the clumping **if** cold-acting antibodies is the cause.

Clumping can be corrected by using blood collection tubes containing an alternative anticoagulant such as sodium citrate or lithium heparin... or so some of the literature claims. Other reports claim that many of the antibodies which cause clumping in EDTA do so in other anitcoagulants.

It is claimed (*by some*) that platelet clumps can be disrupted by vortex mixing… my gut reaction to that is "*OMG*"... but clearly others have had success at this. Just maybe I'll get out a vortex mixer and experiment?

Some More Expert Opinion…

Lixia Zhang, MMed,* Jian Xu, MD,* Li Gao, MMed, Shiyang Pan, MD, PhD. *Spurious Thrombocytopenia in Automated Platelet Count*. Laboratory Medicine 49:2:130-133. 2018

Manthorpe R, Kofod B, et al. Pseudothrombocytopenia, *In vitro studies on the underlying mechanisms*. Scand J Haematol 1981; 26:385-92

Schuff-Werner,Peter, et al. *Effective estimation of correct platelet counts in pseudothrombocytopenia using an alternative anticoagulant based on magnesium salt*. Brit J of Haematol Vol 162, Issue 5. June 29, 2013

Tan, Geok Chin et al. *Pseudothrombocytopenia due to platelet clumping*: A Case Report and Brief Review of the Literature. Case Reports in Hematology. Volume 2016