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Introduction:
The inflammatory response in sepsis can lead to a spectrum of coagulation system defects. Sepsis and severe sepsis is associated with a hypercoagulable state where the clot microstructure is known to be a tight and highly elastic clot, which is potentially resistant to fibrinolysis. Conversely, septic shock is associated with a hypocoagulable state where the clot microstructure is loose and structurally weak. The study aim to investigate the effect of fluid resuscitation and replacement in clot microstructure over 24 hours.

Methods:
100 patients (50 sepsis, 20 severe sepsis and 30 septic shock) were included in the study. All these patients received standard fluid replacement therapy with crystalloids. Blood samples were collected at 0 hours, 4 hours and 24 hours. Clot microstructure, standard markers of coagulation and inflammatory markers were measured.

Results:
In sepsis group following fluid administration, the d_f reduced initially and then remained stable (1.78- 0 hours, 1.74- 4 hours, 1.73- 24 hours, normal d_f range 1.73 ± 0.04). In severe sepsis group, the d_f reduced initially, then increased (1.80- 0 hours, 1.71- 4 hours, 1.76- 24 hours) and in septic shock, the df was very low to start with and there were only slight increase with fluid administration(1.66- 0 hours, 1.68- 4 hours, 1.67- 24 hours).

Conclusion:
The hypercoagulable state and clot quality in both sepsis and severe sepsis group improved with fluid resuscitation, however despite an early improvement in clot quality, ongoing fluid resuscitation resulted in markedly reduced functional clot with very low clot strength and functionality. This study demonstrates that d_f as a marker of clot quality and function may have potential in fluid and component replacement in critical illness and injury.

References:

Image :
Interpretation of the Clot Microstructure and Strength in Sepsis

<table>
<thead>
<tr>
<th>Healthy</th>
<th>Sepsis</th>
<th>Septic Shock</th>
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<tbody>
<tr>
<td>Df 1.73</td>
<td>Df 1.8%</td>
<td>Df 1.64</td>
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<tr>
<td>• Normal clot microstructure</td>
<td>• Tight clot structure</td>
<td>• Loose clot structure</td>
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<tr>
<td>• Normal branching</td>
<td>• Increased branching</td>
<td>• Reduced branching</td>
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</tbody>
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[Images of normal clot, tight clot, and loose clot structures with red areas indicating high fibrin branch density and clot growth.]

*Computer model of clot microstructure in healthy, sepsis and septic shock*