### Table a. Studies on embolism in sheep

<table>
<thead>
<tr>
<th>Authors</th>
<th>Fracture</th>
<th>Technique studied</th>
<th>Embolus measurement</th>
<th>Haemodynamics</th>
<th>Inflammation/coagulation</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wozasek¹</td>
<td>No</td>
<td>Reamed nailing</td>
<td>No</td>
<td>Variable effect on PAP</td>
<td>No</td>
<td>Additional effect from haemorrhagic shock and endotoxia</td>
</tr>
<tr>
<td>Wozasek²</td>
<td>No</td>
<td>Reamed nailing</td>
<td>Echo via thoracotomy</td>
<td>No</td>
<td>No</td>
<td>Association between intraosseous pressure, instrumentation and embolus</td>
</tr>
<tr>
<td>Duwelius³</td>
<td>Osteotomy</td>
<td>UIMN vs RIMN</td>
<td>Infravascular echo</td>
<td>SBP, PAP, CO</td>
<td>No</td>
<td>No significant difference comparing reaming, nailing and pulmonary injury</td>
</tr>
<tr>
<td>Mousavi et al⁴</td>
<td>Osteotomy</td>
<td>RIMN Two types, speeds Reamers: 3 types</td>
<td>SBP, CVP related to driving speed PAP</td>
<td>Neutrophils</td>
<td>Hypovolaemia intramedullary pressure compared</td>
<td></td>
</tr>
<tr>
<td>Pape⁵</td>
<td>No</td>
<td>RIMN vs UIMN</td>
<td>No</td>
<td>Transient increase in PAP during reaming</td>
<td>Neutrophils</td>
<td>No change in neutrophil activity Pulmonary permeability increases Neutrophil activity variable Pulmonary permeability increases</td>
</tr>
<tr>
<td>Pape et al⁶</td>
<td>No</td>
<td>Direct injection of air, marrow and saline</td>
<td>Echo of vena cava Histology</td>
<td>No</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Wenda³</td>
<td>No</td>
<td>Direct injection of bone marrow suspension via PA catheter</td>
<td>Histology</td>
<td>No</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Neudeck⁸</td>
<td>Osteotomy(week)</td>
<td>RIMN vs UIMN vs plate</td>
<td>PAP not significantly affected</td>
<td>No</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Wolinsky⁹</td>
<td>Osteotomy</td>
<td>RIMN assessing effect of chemical lung injury</td>
<td>PAP increased with reaming and cement Histology – no inflammation</td>
<td>After 72 hours</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Schemitsch¹⁰</td>
<td>Osteotomy</td>
<td>Plate vs RIMN vs UIMN</td>
<td>PAP increased with reaming and cement Histology – no inflammation</td>
<td>After 24 hours</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liska²⁰</td>
<td>No</td>
<td>Canine THR</td>
<td>TOE detected emboli</td>
<td>No</td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>

* UIMN, unreamed intramedullary nail; RIMN, reamed intramedullary nail
† PAP, pulmonary artery pressure; SBP, systemic blood pressure; CO, cardiac output; CVP, central venous pressure
‡ TOE, transoesophageal echocardiography

### Table b. Studies on embolism in other animals

<table>
<thead>
<tr>
<th>Authors</th>
<th>Fracture</th>
<th>Technique studied</th>
<th>Embolus measurement</th>
<th>Haemodynamics</th>
<th>Inflammation/coagulation</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buttaro¹¹</td>
<td>No</td>
<td>RIMN vs UIMN</td>
<td>Histology</td>
<td>Non-significant change in PAP</td>
<td>No</td>
<td>Source of fat</td>
</tr>
<tr>
<td>Rautanen¹²</td>
<td>No</td>
<td>Direct injection of bone marrow suspension via PA catheter</td>
<td>Histology</td>
<td>No</td>
<td>No</td>
<td>Description of lung pathology See text</td>
</tr>
<tr>
<td>Kerstel¹³</td>
<td>Both femoral – pipe tongs</td>
<td>Nil</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>See text</td>
</tr>
<tr>
<td>Jacobs¹⁴</td>
<td>Blows with steel bar</td>
<td>Reaming</td>
<td>Lung histology Fat from femoral veins quantified</td>
<td>No</td>
<td>No</td>
<td>After 72 hours</td>
</tr>
<tr>
<td>Manning¹⁶</td>
<td>Three point bending fracture</td>
<td>Reaming plus pressurised cement</td>
<td>History</td>
<td>PAP increased after cement</td>
<td>History – no inflammation History – no inflammation</td>
<td>After 24 hours</td>
</tr>
<tr>
<td>Elmaraghy¹⁷</td>
<td>Chest injury vs fat embolism</td>
<td>Cement/lavage</td>
<td>Femoral vein triglycerides</td>
<td>PAP increased after cement PAP increased after reaming and cement PAP increased with reaming and cement</td>
<td>History – no inflammation History – no inflammation History – no inflammation</td>
<td>After 72 hours</td>
</tr>
<tr>
<td>Elmaraghy¹⁸</td>
<td>Plate vs RIMN vs UIMN</td>
<td>History</td>
<td>PAP increased with reaming and cement</td>
<td>History</td>
<td>After 24 hours</td>
<td></td>
</tr>
<tr>
<td>Schemitsch¹⁹</td>
<td>Osteotomy and bend</td>
<td>Plate vs RIMN vs UIMN</td>
<td>Histology</td>
<td>PAP increased with reaming and cement</td>
<td>History</td>
<td>After 24 hours</td>
</tr>
<tr>
<td>Liska²⁰</td>
<td>No</td>
<td>Canine THR</td>
<td>TOE detected emboli</td>
<td>No</td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>

* RIMN, reamed intramedullary nail; UIMN, unreamed intramedullary nail; THR, total hip replacement
† NA, not available; TOE, transoesophageal echocardiography; IVC, inferior vena cava
‡ PAP, pulmonary artery pressure; SBP, systemic blood pressure; CVP, central venous pressure
References


