Key Facts

- Digital chest drainage and monitoring systems can be safely applied in cardiac surgery patients.
- The use of the digital drainage and monitoring system significantly decreased the incidence of chest drainage-associated complications and led to earlier chest tube removal.
- Digital chest drains provide continuous, precisely controlled, uninterrupted drainage from the operating room onwards and allow fast objective clinical decisions.

Objective, Methods and Study Population

- This trial was designed to investigate potential differences between an analog wet-seal system (Atrium Ocean; Maquet, Germany) and a digital chest drainage and monitoring system (Thopaz+; Medela, Switzerland) in elective cardiac surgery patients in a German hospital.
- Prospective, randomized, single-center designed study in cardiac surgery patients.
- All elective adult patients (≥18 years of age; n=354) scheduled for cardiac surgery could be enrolled.

Results

Primary endpoint:

**Incidence of at least one chest X-ray with a clamped drain as evaluation of suspected air leak.**

The incidence of chest X-rays to detect air leaks was significantly lower for patients who have received the digital chest drainage and monitoring system (analog: 20.2%; digital: 8.6%; p≤0.01).

Secondary endpoints:

**Incidence of re-thoracotomies due to tamponade or bleeding**

Non-significant reduction of 3.3 percentage points in re-thoracotomies due to tamponade/bleeding, when digital chest drainage and monitoring systems were used. This means an absolute reduction of approximately 60%.

<table>
<thead>
<tr>
<th></th>
<th>Analog System</th>
<th>Digital System</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Re-thoracotomy rate (in %)</td>
<td>5.3%</td>
<td>2.0%</td>
<td>0.19</td>
</tr>
</tbody>
</table>

**Time to chest drain removal**

Significantly shortened median drainage duration of 16 hours, representing a reduction of roughly 25%.

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<th>Digital System</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chest tube duration (in hours)</td>
<td>65 hrs</td>
<td>49 hrs</td>
<td>0.01</td>
</tr>
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</table>

Other secondary endpoints:

**There was no evidence of a difference between both groups concerning:**

- Total amount of drained fluid (median) at the time of chest drain removal.
- Length of ICU and hospital stay. This may be explained by the postoperative pathway of the clinic, where cardiac surgery patients are hospitalized for at least 1 week and then directly go to rehab.