PATIENTS WITH SIX CANNULATION SITES FOR HEMODIALYSIS CORRELATED WITH DECREASED OCCURRENCE OF AV SHUNT THROMBOSIS IN TAIPEI HOSPITAL

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Taiwan has the world’s highest prevalence of end stage renal disease (ESRD) and dialysis at 2,902 per million\(^1\)

The lifetime cost of hemodialysis per patient in Taiwan amounts to approximately $185,235 +/- $9,623 US dollars\(^2\)

Funding for this falls to Taiwan’s Universal Healthcare System and government funding
HEMODIALYSIS

- **Hemodialysis:**
  - Used in cases of ESRD
  - Process of purifying blood and removing waste

- **Types of Shunts used:**
  - Fistula (Left image)
  - Graft (Right image)
  - Catheter (Through veins in neck or port)

- **Cannulation / Injection Sites:**
  - Dependent on the design of fistula or graft

COMPLICATIONS & MANAGEMENT

- **Thrombosis** is among the ***most common complications*** that can lead to a ***failed AV shunt*** ⁴

- Treatment at Taipei Hospital involves the use of **tissue plasminogen activator** (tPA)

- tPA is ***not always effective*** at reestablishing blood flow
  
  - May require ***surgical intervention***
  
  - Patient can face ***additional complications*** including emboli and ruptures

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<table>
<thead>
<tr>
<th>Complications of AVFs associated with chronic use</th>
<th>Incidence %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thrombosis</td>
<td>17–25</td>
</tr>
<tr>
<td>Stenosis</td>
<td>14–42</td>
</tr>
<tr>
<td>Congestive heart failure</td>
<td>12.2–17</td>
</tr>
<tr>
<td>Ischemic neuropathy</td>
<td>1–10</td>
</tr>
<tr>
<td>Steal syndrome</td>
<td>2–8</td>
</tr>
<tr>
<td>Aneurysm</td>
<td>5–6</td>
</tr>
<tr>
<td>Infection</td>
<td>2–3</td>
</tr>
</tbody>
</table>

Source: Modified from https://www.karger.com/Article/FullText/343669
We aimed to investigate the relationship between number of injection sites and the resulting need to utilize tPA.

We hypothesized that patients with more injection sites for hemodialysis would have fewer incidences of clotted AV shunts and the need to use tPA in Taipei Hospital, Ministry of Health and Welfare.

Decreased incidence of thrombosis and management of failed AV shunts would alleviate some financial burden on government.
MATERIALS AND METHODS

- Collected data from **115** hemodialysis patients
- **Data collected by:**
  - Reviewing electronic records
  - Assistance of hemodialysis nurses to determine the number of available injection sites
- **Data collected includes:**
  - **Age** of patient
  - **Duration** of hemodialysis treatment
  - **Number** of available injection sites for hemodialysis
  - **Type** of AV shunt
  - **Frequency** of tPA used in clearing shunt
  - **Karnofsky score** (measurement of patient frailty)
  - **Co-morbidities** (diabetes and hypertension)
RESULTS: INJECTION SITES

• Patients with 6 injection sites made up 68.9% (31 out of 45) of the total patients with no use of tPA.

• Patients with 6 injection sites presented with the lowest rate of requiring the use of tPA five times or greater to clear the shunt at 5.6% of patients (4 out of 73).
RESULTS: KARNOFSKY SCORE

Chart comparing Karnofsky score in patients

**Karnofsky Score**

<table>
<thead>
<tr>
<th>Definition</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Able to carry on normal activity and to work; no special care needed</td>
<td>100</td>
</tr>
<tr>
<td>Unable to work; able to live at home and care for most personal needs;</td>
<td>90</td>
</tr>
<tr>
<td>varying amount of assistance needed</td>
<td>80</td>
</tr>
<tr>
<td>Unable to care for self; requires equivalent of institutional or hospital</td>
<td>70</td>
</tr>
<tr>
<td>care; disease may be progressing rapidly</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>0</td>
</tr>
</tbody>
</table>


No correlations noted for frailty score
RESULTS: CO-MORBIDITIES

Comparison of injection sites status with **Diabetes** and **Hypertension** status. **No correlations noted** for diabetes or hypertension status.
CONCLUSION AND DISCUSSION

- Patients with 6 injection sites made up 68.9% (31 out of 45) of the total patients with no use of tPA.

- Patients with 6 injection sites presented with the lowest rate of requiring the use of tPA five times or greater to clear the shunt at 5.6% of patients (4 out of 73).

- Patients with 6 injection sites are more likely to have no occurrences of the use of tPA for thrombosis.

- 6 injection sites may be optimal – treatment three times a week, two sites per day of treatment.

- No significant correlations noted in Karnofsky score, diabetes, or hypertension and number of injection sites.

- Results from preliminary study suggests it may be beneficial to pursue AV shunts capable of 6 injection sites.

- Further studies are warranted to evaluate a larger population with a greater patient distribution for a more significant trend.
REFERENCES


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