Clinical utility of skin perfusion pressure measurement in patients of Diabetic foot

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Introduction

• Up to 50% of the patients with diabetes and a foot ulcer have peripheral artery disease (PAD)
• CT angiography (Sensitivity 91%, Specificity 99%, RADIOLOGY 2005) & Skin perfusion pressure (Evaluation Small arteries, ANGIOLOGY 2011) is performed to examine PAD
• Skin perfusion pressure is Laser doppler and pressure cuff

Material and methods

From November 2016 to December 2017, 40 patients

<table>
<thead>
<tr>
<th>Measurement</th>
<th>1) CT angiography</th>
<th>2) Skin perfusion pressure (Vasamed, Sensilase PAD-IQ)</th>
<th>3) Wound classification (Wagner, university of Texas Diabetic foot ulcer)</th>
</tr>
</thead>
</table>

⇒ Each result is quantified for providing statistics.

CT angiography

: Anterior Tibia Artery
Posterior Tibia Artery
Peroneal Artery
Normal(1) Moderate(2) Severe(3)

Skin perfusion pressure (Vasamed, Sensilase PAD-IQ)

SPP ≥ 50mmHg SPP 30 to 50mmHg SPP<30mmHg
Normal(1) Moderate(2) Severe(3)

Wagner ulcer classification

Grade: Lesion
1. Superficial diabetic ulcer
2. Ulcer extension involving ligaments, tendon, joint capsule, or fascia with no abscess or osteomyelitis
3. Deep ulcer with abscess or osteomyelitis
4. Gangrene to portion of foot loss
5. Extensive gangrene of foot

Wagner classification is quantified by grade of diabetic foot ulcers

University of Texas diabetic foot ulcers classification

<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage A</td>
<td>No infection or ischemia</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stage B</td>
<td>Infection present</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stage C</td>
<td>Ischemia present</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stage D</td>
<td>Infection and ischemia present</td>
<td></td>
<td></td>
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</tbody>
</table>

Skin classification is quantified by combining stage and grade of diabetic foot ulcers

Purpose

• To investigate the clinical usefulness of skin perfusion pressure by comparing skin perfusion pressure, CT angiography, and wound grade

Limitations

1. In-hospital patients: selective bias
2. Not check Inter-observer correlation coefficient: reduced reliability
3. Number of subjects is small

Statistical Analysis

⇒ Pearson correlation coefficient

Results

<table>
<thead>
<tr>
<th></th>
<th>Average</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>CT angiography</td>
<td>2.27</td>
<td>0.87</td>
</tr>
<tr>
<td>Skin perfusion pressure</td>
<td>1.75</td>
<td>0.74</td>
</tr>
<tr>
<td>Wagner</td>
<td>3.02</td>
<td>1.25</td>
</tr>
<tr>
<td>Texas</td>
<td>6.40</td>
<td>3.59</td>
</tr>
<tr>
<td>Age</td>
<td>70.30</td>
<td>9.05</td>
</tr>
</tbody>
</table>

CT angiography

⇒ Normal(1)/ Moderate(2)/ Severe(3)
Skin perfusion pressure

⇒ SPP ≥ 50mmHg SPP 30 to 50mmHg < 30mmHg
⇒ Normal(1): Moderate (2): Severe (3)
⇒ CT angiography, Skin perfusion pressure, Wagner ulcer classification, Texas classification are quantified by scoring system for Results

1. CT angiography was correlated with age (p=0.004) 2. CT angiography correlated poorly with Wagner, University of Texas diabetic foot ulcer classification, skin perfusion pressure 3. Skin perfusion pressure correlated with University of Texas diabetic foot ulcer classification (p=0.004)

Conclusion

• Skin perfusion pressure may be useful in the evaluation of diabetic foot wound
• It may be helpful to measure skin perfusion pressure with CT angiography When treating diabetic foot wound