Cost Effectiveness of Carbon Dioxide as Contrast Medium to Guide Endovascular Treatment of Chronic Lower Limb Ischemic Patients with Impaired Renal Function

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**Background**

Iodine contrast medium (ICM) is considered to be gold standard in endovascular procedures, but its nephrotoxicity and hypersensitivity limit the widespread use. Carbon dioxide (CO₂) is considered as an alternative for endovascular procedures in patients with contraindication to ICM. However, no studies have compared their outcomes.

**Objective**

The aim of the study was to show the cost effectiveness of CO₂ as contrast agent in impaired renal function patients in endovascular treatment of chronic lower limb ischemia compared to (ICM).

**Patients & Methods**

From May 2016 to April 2017, 16 chronic lower limb ischemia patients with impaired renal function admitted to Alexandria Military Hospital and ElAmria General Hospital underwent endovascular procedures in a prospective randomized control study.

Patients were randomized into 2 groups:
- CO₂ Group.
- ICM Group.

**Technique**

Slow rate injection to allow a period of time (2 - 3 Minutes) for CO₂ clearance between injections. Fair warning to the patient. Finally, in extreme cases, general anesthesia may be an option.

**Angiodroid CO₂ Injector**

**Conclusion**

The use of CO₂ as contrast medium for endovascular treatment of chronic lower limb ischemia in impaired renal function patients is an alternative for ICM, regarding duration of surgery, duration of fluoroscopy, and endovascular material costs. Using CO₂, there were no changes in creatinine clearance and no risk of hypersensitivity reaction; moreover, there was a reduction in contrast-related costs for the procedures.

**Results**

<table>
<thead>
<tr>
<th>Age</th>
<th>A</th>
<th>B</th>
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<tbody>
<tr>
<td>Years</td>
<td>66.74</td>
<td>68.51</td>
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<table>
<thead>
<tr>
<th>Gender (Male/Female)</th>
<th>A</th>
<th>B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male/Female</td>
<td>6/2</td>
<td>5/3</td>
</tr>
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**Type of Procedure**

- There were no conversions to open surgery.
- Endovascular material costs did not change.
- Pre operative preparation was not needed in group A.
- Time of fluoroscopy:
  - A: 49.05 Minutes
  - B: 48.73 Minutes

**Cost of Patient Preparation & Follow Up**

All patients IN GROUP (B) needed:
1. Pre operative preparation costed +480 LE.
2. Post operative treatment costed +480 LE.
3. One patient (12.5%) underwent haemodialysis.

**Complications**

- Paresthesia: 0%
- Abdominal Pain: 12.5%
- Tenesmus & Nausea: 12.5%
- Vapor Lock: 0%