Surgeon or Operator Radiation Dose During Simple and Complex Endovascular Interventions: How Many Procedures Can An Operator Do Safely And How Can Dosage Be Decreased

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Surgeon radiation & endovascular procedures

• nanodot dosimeters were placed outside the lead apron of the operators at the left upper chest and left lower pelvis positions

Table I. Operator dose by procedure type

<table>
<thead>
<tr>
<th>Procedure type</th>
<th>NS</th>
<th>Mean, μSv</th>
</tr>
</thead>
<tbody>
<tr>
<td>CV</td>
<td>3</td>
<td>2 ± 1</td>
</tr>
<tr>
<td>SFA</td>
<td>4</td>
<td>10 ± 2</td>
</tr>
<tr>
<td>ORS</td>
<td>4</td>
<td>6 ± 2</td>
</tr>
<tr>
<td>TAAA</td>
<td>4</td>
<td>8 ± 2</td>
</tr>
<tr>
<td>Pararenal</td>
<td>4</td>
<td>6 ± 2</td>
</tr>
<tr>
<td>Overall</td>
<td></td>
<td>9 ± 1</td>
</tr>
</tbody>
</table>

Physician-sponsored Investigational Device Exemption (IDE)

Surgeon radiation & endovascular procedures

• Surgeon radiation during complex fluoroscopically guided interventions (FGIs) has not been well studied

• To characterize radiation exposure to surgeons during FGIs based on procedure type, operator position, level of training, and addition of protective shielding

Surgeon radiation & endovascular procedures

Pararenal aneurysms
Fenestrated with/out helical branch
Directional cuffed branch

>10,000 fenestrated endograft implants*
(Asia, Australia, South America, Canada, US - Physician-initiated IDE, US trial)

* Cook Medical (personal communication)
Operator dose & kerma-area product (KAP)

Upper & lower body operator doses & table-mounted shielding skirt

Conclusions

- Surgeon radiation dose during FGIs depends on case type, operator position, and table skirt use but not on the level of fellow training
- The primary operator could perform 12 FEVARs/wk & have an annual dose <10mSv, which would not exceed lifetime occupational dose limits during a 35-year career
- With practical case loads, operator doses are relatively low and unlikely to exceed occupational limits

Fenestrated endografts

Radiation exposure in 78 patients

Surgeon Education & Radiation

- increasing table height
- Use collimation and angulation
- Decreasing magnification modes
- Maintaining minimal patient-to-detector distance