Comparison of outcomes between two surgical approaches used to remove uroliths in desert tortoises: A retrospective analysis of 108 cases

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Introduction

- Bladder uroliths are a common pathologic finding in the Mojave desert tortoise (Gopherus agassizii).
- These calculi, usually urate in origin, can be due to dehydration, but also form due to nutritional imbalances or abnormal urine pH.
- Surgical removal of large uroliths is recommended using one of two techniques: a prefemoral approach or a plastronotomy.
- Factors to determine which surgical approach to use include sex, time of year, size of stone, size of tortoise, and surgeon’s preference.
- The goal of this study is to compare the two surgical techniques to determine which is associated with the best patient outcomes.

Methods

- Abstracted data from 108 medical records from tortoises that had surgery to remove uroliths (66 prefemoral approach and 42 plastronotomy) at the San Diego Zoo Safari Park from June 2009 to July 2014.
- Inclusion criteria were routine surgical procedures performed on healthy, asymptomatic adult tortoises.
- Descriptive statistical analysis performed.
- Two-by-two contingency tables created using intraoperative complications compared with variables such as surgical technique, gender, tortoise weight, and stone area to calculate odds ratios.
- Intraoperative complications included bladder tears, moderate to severe coelomic contamination, excessive hemorrhage due to paramedian vein damage, and inability to locate bladder stone.

Results

<table>
<thead>
<tr>
<th>Population Characteristics</th>
<th>Intraoperative Complications</th>
<th>Surgery Type Performed</th>
<th>Gender</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
<td>Female</td>
</tr>
<tr>
<td>Overall</td>
<td>108</td>
<td>31</td>
<td>68</td>
</tr>
<tr>
<td>Prefemoral</td>
<td>66</td>
<td>18</td>
<td>52</td>
</tr>
<tr>
<td>Plastronotomy</td>
<td>42</td>
<td>13</td>
<td>30</td>
</tr>
</tbody>
</table>

Odds Ratio: 0.8365 (0.3578-1.956)

Odds Ratio: 2.292 (0.9802-5.358)

In the skin will be made just cranial to hindlimb to access coelomic cavity. 4) Bladder exteriorized through a prefemoral incision and then incised. Large stones were crushed or broken apart in the bladder and smaller stone fragments removed. 5) Tortoise prepped for plastron approach. 6) Surgical saw used to remove section of plastron. 7) Coelomic membrane incised exposing bladder. 8) Bladder incised exposing urolith. 9) Urolith being removed from the bladder; plastron fragment will be replaced and resin applied to seal the shell.

Conclusion & Future Studies

Based on the preliminary findings, the most significant risk factor associated with intraoperative complications of the four variables analyzed is the area of the stone being removed, with larger stones being three times more likely to result in intraoperative complications. Based on the odds ratio of 0.84 between the prefemoral and plastronotomy techniques, there is no difference between the two in terms of intraoperative complications.

Additional statistical calculations, such as regression modeling, can be used to strengthen associations between surgical type and intraoperative complications. Other measures of surgical outcome could also be analyzed, such as time to return to normal function (eating and defecating) or post-surgical survival. In addition, work is being done to medical management of uroliths such as dissolution of stone in the bladder.

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References