The Use of Image Guidance in Minimally Invasive Pituitary Surgery

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ABSTRACT

The use of image guidance in minimally invasive pituitary surgery has become the favored approach for the past forty years. Traditionally, fluoroscopy has been the standard in pituitary surgery. Nowadays, however, the use of BrainLAB VectorVision (BrainLAB, Feldkirchen, Germany) has revolutionized the way surgery is performed and brings higher visual accuracy and surgical precision. In this study, we evaluate the utility of computer-assisted image guidance, and to assess the efficacy of fluoroscopy versus BrainLAB image guidance.

INTRODUCTION

The use of image guidance in surgery has been increasing exponentially over the 20th century. More recently, the technological advancements have been focused on the minimally invasive surgery, for the past forty years with the introduction of neuroendoscopy. New, minimally invasive surgical approaches have been developed allowing for a better, faster, safer, more precise, and cost-effective technique.

METHODS

One hundred twenty-one consecutive patients were examined. Inclusion criteria for the BrainLAB group and this inclusion criteria, a sample size of 70 was obtained. Nineteen patients were treated using BrainLAB and 3 cases (4%, mean age 36.3) involved both BrainLAB and fluoroscopy. The average surgical time (min) for fluoroscopy and BrainLAB was 131 and 107.9 (p = 0.0079), respectively. The average age of the patients treated using BrainLAB was 37% in the BrainLAB group (107.9 minutes) than the fluoroscopy group (131 minutes) (p = 0.0165 univariate analysis, p = 0.0079 multivariate analysis). There was no significant difference in the rate of adverse events between the two groups (p = 0.2630).

RESULTS

Although there was a reduction in image guidance procedures of which 70 were included in the study, there was no significant difference in the rate of adverse events between the two groups (p = 0.6577). However, surgery time and adverse events were significantly higher in the BrainLAB group compared to the fluoroscopy group (p = 0.0079). There was no significant difference in the rate of adverse events between the two groups (p = 0.6577).

CONCLUSION

BrainLAB and fluoroscopy are both valuable tools in the field of neurosurgery. While BrainLAB may be more expensive, it offers higher visual accuracy and surgical precision. In conclusion, our results indicate that BrainLAB is a useful tool in the field of neurosurgery, and should be considered for future studies.

REFERENCES


CONTACT

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FIGURE 4.

Table 1. Clinical Analysis

<table>
<thead>
<tr>
<th>Procedure</th>
<th>BrainLAB</th>
<th>Fluoroscopy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>37.3 ± 13.3</td>
<td>40.1 ± 13.4</td>
</tr>
<tr>
<td>Gender</td>
<td>Male 59 (77.5%)</td>
<td>Male 64 (80%)</td>
</tr>
<tr>
<td>Race</td>
<td>White 65 (86.7%)</td>
<td>White 72 (90.1%)</td>
</tr>
<tr>
<td>Operation Time (min)</td>
<td>107.9 ± 20.2</td>
<td>131 ± 37.6</td>
</tr>
</tbody>
</table>

Table 2. Adverse Events

<table>
<thead>
<tr>
<th>Event</th>
<th>BrainLAB</th>
<th>Fluoroscopy</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSF Leak</td>
<td>1 (1.4%)</td>
<td>2 (2.6%)</td>
</tr>
<tr>
<td>Cerebral Edema</td>
<td>2 (2.6%)</td>
<td>3 (3.8%)</td>
</tr>
<tr>
<td>Hypopituitarism</td>
<td>1 (1.4%)</td>
<td>1 (1.3%)</td>
</tr>
</tbody>
</table>

DISCUSSION

BrainLAB offers real-time image guidance, for an improved accuracy and surgical precision. This novel navigation system allows for better visualization of the surgical field and reduces the risk of complications. Overall, this study provides valuable insights into the use of image guidance in minimally invasive pituitary surgery.