Intraoperative PTH Monitoring in Normohormonal Primary Hyperparathyroidism

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INTRODUCTION

Normohormonal hyperparathyroidism (NHPHP) is a subset of primary hyperparathyroidism where patients present with normal PTH levels despite elevated serum calcium. This disease variant creates clinical challenges regarding intraoperative PTH (IOPTH) monitoring during parathyroidectomy. NHPHP patients are more likely to have multiglandular disease and smaller sized adenomas, making it more difficult to reliably localize the adenomas using pre-operative imaging. This more often leads to bilateral neck exploration to successfully identify and remove all hyperactive glands.

Furthermore, reliance on IOPTH decay proves challenging since preoperative IOPTH is already in the normal range. Traditionally, intraoperative success has been defined as decline in IOPTH levels ≥50% from the baseline preoperative level. This study aimed to determine what percent reduction in post-excision IOPTH from baseline would yield a cure rate in NHPHP patients similar to that of classic primary hyperparathyroidism (PHP).

METHODS

This was a single institution retrospective cohort study of 497 patients that underwent parathyroidectomy for primary hyperparathyroidism between July 2013 and February 2020. Information collected via chart review included patient demographic information, symptoms, prior neck surgeries, pre-, intra-, and post-operative laboratory values, and pathology reports. NHPHP was subdivided into two treatment groups based on (1) diagnosis of NHPHP based on preoperative intact PTH in the normal range and (2) diagnosis of NHPHP based on preoperative IOPTH in the normal range. The respective control groups were based on patients with classic PHP and 467 patients in the control group based on patients who demonstrated classic PHP based on baseline IOPTH. There were 28 patients (5.6%) in NHPHP group based on baseline IOPTH on the day of surgery (Group 2) and 467 patients in the control group based on patients who demonstrated classic PHP based on baseline IOPTH. Patient information regarding age, gender, BMI, and pre-operative laboratory values can be found in Tables 1 and 2.

RESULTS

Of the 497 patients, 496 were included in the study. There were 66 patients (13.3%) in the NHPHP group based on preoperative intact PTH (Group 1) and 430 patients in the control group based on patients who demonstrated classic PHP based on preoperative intact PTH. There were 28 patients (5.6%) in NHPHP group based on baseline IOPTH on the day of surgery (Group 2) and 467 patients in the control group based on patients who demonstrated classic PHP based on baseline IOPTH. Patient information regarding age, gender, BMI, and pre-operative laboratory values can be found in Tables 1 and 2.

Table 1: Demographic data for the NHPHP group based on preoperative intact PTH compared to its control group.

<table>
<thead>
<tr>
<th>Gender (Female)</th>
<th>Group 1: NH based on Pre-operative Intact PTH</th>
<th>Group 1 Control (PHP)</th>
</tr>
</thead>
<tbody>
<tr>
<td>% of 65 (80.1%)</td>
<td>53 of 65 (80.1%)</td>
<td>338 of 410 (81.4%)</td>
</tr>
<tr>
<td>Age (years)</td>
<td>N Median IQR</td>
<td>N Median IQR</td>
</tr>
<tr>
<td>66</td>
<td>66.1 50.0-66.0</td>
<td>430 61 52.0-70.0</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>N Median IQR</td>
<td>N Median IQR</td>
</tr>
<tr>
<td>66</td>
<td>27.5 24.4-31.9</td>
<td>429 30.6 26.0-34.9</td>
</tr>
</tbody>
</table>

Table 2: Demographic data for the NHPHP group based on pre-incision IOPTH compared to its control group.

<table>
<thead>
<tr>
<th>Gender (Female)</th>
<th>Group 2: NH based on Pre-Incision IOPTH</th>
<th>Group 2 Control (IOPTH)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 of 28 (57.9%)</td>
<td>365 of 467 (78.4%)</td>
<td>365 of 467 (78.4%)</td>
</tr>
<tr>
<td>Age (years)</td>
<td>N Median IQR</td>
<td>N Median IQR</td>
</tr>
<tr>
<td>28</td>
<td>28.5 24.3-31.9</td>
<td>467 61.0 52.0-70.0</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>N Median IQR</td>
<td>N Median IQR</td>
</tr>
<tr>
<td>28</td>
<td>28.5 24.3-31.9</td>
<td>467 30.4 25.8-34.8</td>
</tr>
</tbody>
</table>

The traditional ≥50% decline in 15-minute post-excision IOPTH from baseline may still be adequate in achieving reasonable rate of cure in NHPHP patients. However, a ≥75% decline provides a more stringent criterion for achieving high rates of cure in NHPHP parathyroidectomy patients for surgeons who prefer stricter criterion.

CONCLUSIONS

The traditional ≥50% decline in 15-minute post-excision IOPTH from baseline may still be adequate in achieving reasonable rate of cure in NHPHP patients. However, a ≥75% decline provides a more stringent criterion for achieving high rates of cure in NHPHP parathyroidectomy patients for surgeons who prefer stricter criterion.

REFERENCES