EFFECT OF PARATHYROIDECTOMY ON PATIENTS WITH TERTIARY HYPERPARATHYROIDISM (RETROSPECTIVE STUDY)

By
Atif Abd El-Latif, M.D.; Tarek Ibrahim Mahdy, M.D.; Yaser Ali Elsayed M.D. and Mohamed Fatahalla EL-Ghandour M.B.B.CH.

From
Endocrine Surgery Unit, Department of General Surgery,
Faculty of medicine, Mansoura University

ABSTRACT
Objective: The aim of this work was to study the effect of parathyroidectomy on patients with tertiary hyperparathyroidism.

Patients and methods: A total number of 10 patients with tertiary hyperparathyroidism manifestations under went parathyroidectomy, where the patients with adenoma of parathyroid gland under went excision of adenoma or multiple adenomas, and patients with hyperplasia of parathyroid gland underwent total parathyroidectomy and implantation of a part of one parathyroid gland into the sternomastoid muscle.

Results: There were significant changes in clinical and laboratory values between pre- and post operative measures in both types of patients (adenoma and hyperplasia) where there were significant decrease in serum calcium, serum alkaline phosphatase and parathyroid hormone (P.T.H.) and great changes in preoperative manifestations.

Conclusion: From this study we can conclude that the optimal treatment of tertiary hyperparathyroidism is surgical excision of adenoma or adenomas, or total parathyroidectomy and transplantation of a part of one gland into the sternomastoid

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supplementation, and thus carries a higher cost; and (3) there is always some risk of primary failure of the transplanted tissue where in case of presence of adenoma we should excise the adenoma or the adenomas. then in this study more details about surgical treatment will be conducted(2).

PATIENTS AND METHODS

This retrospective study had been conducted on chronic renal failure patients (10 patients), with manifestations of tertiary hyperparathyroidism (THPT), all patients had been referred from renal dialysis units.

During the period between September, 2000, and April 2004, all patient underwent parathyroidectomy at endocrine surgery unit - Mansoura University Hospital.

Our patients were collected on data base including serum calcium, inorganic phosphate, alkaline phosphatase, and (parathyroid hormone) PTH.

Preoperative localizing studies was used as neck US, neck CT and sestamibi (parathyroid scan).

In case of adenoma patients: we excised the glands which have the adenoma and which are preoperatively localised whether one or multiple adenoma.

In case of hyperplasia patients: we excised the four parathyroid glands and division of one gland into two halves one half is discarded and the other half is divided into (6-8) fragments and transplanted into a pocket in the sternomastoid muscle.

The following is the 10 patients in details.

RESULTS

The ages ranged between 40 - 50 years in patients with adenoma and 30 - 60 years in patients with hyperplasia. They were five males and two females in adenoma patients and two females and one male in hyperplasia patients.

The average duration of dialysis was 30 months in adenoma patients and 20 months in hyperplasia patients (Table 1 and figure1,2).

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There was a significantly higher rate of transient postoperative hypocalcemia in the hyperplasia patients (30%) and than in the adenoma patients (5%) (Table 6). Importantly, one of the patients in the hyperplasia group with enlargement of a single gland underwent a subtotal parathyroidectomy and developed hypocalcemia. Two patients of hyper group underwent total parathyroidectomy with autotransplant. Patients who had transient postoperative hypocalcemia required oral calcium and/or vitamin D supplementation lasting 2 to 18 months. In all patients, hypocalcemia resolved. In contrast, only one of the patients in the adenoma patients required oral calcium and vitamin D supplementation for several weeks. Low serum calcium level coincided with an episode of acute pancreatitis; thus, it is unclear whether the etiology of hypocalcemia was truly secondary to the surgery performed or to the pancreatitis.

Other surgical complications in either group were rare. There were no postoperative hematomas or infections, and only one patient experienced transient, recurrent laryngeal nerve neuropraxia that resolved within 2 weeks.

Follow-Up:
The average follow-up was 36 months. Although there were more instances of recurrence or persistent disease in the hyperplasia patients (n = 1) versus the adenoma patients (n = 0), this did not approach statistical significance (Table 7).
**Table (4):** Postoperative laboratory values and follow-up data

<table>
<thead>
<tr>
<th></th>
<th>Adenoma (n= 7)</th>
<th>Hyper (n= 3)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calcium</td>
<td>9.12 ± 0.37</td>
<td>9.08 ± 0.16</td>
<td>0.874</td>
</tr>
<tr>
<td>Phosphate</td>
<td>3.36 ± 0.29</td>
<td>3.46 ± 0.04</td>
<td>0.583</td>
</tr>
<tr>
<td>Alkaline phosphatase</td>
<td>89.93 ± 8.73</td>
<td>98.73 ± 2.04</td>
<td>0.039*</td>
</tr>
<tr>
<td>Intact PTH (pg/mL)</td>
<td>54.01 ± 6.14</td>
<td>48.43 ± 2.54</td>
<td>0.177</td>
</tr>
</tbody>
</table>

**Table (5):** Comparison between pre and post laboratory values.

<table>
<thead>
<tr>
<th></th>
<th>Preoperative</th>
<th>Postoperative</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>P.T.H</td>
<td>505.3 ± 87.87</td>
<td>52.34 ± 5.82</td>
<td>0.000*</td>
</tr>
<tr>
<td>Calcium</td>
<td>11.11 ± 0.62</td>
<td>9.11 ± 0.31</td>
<td>0.000*</td>
</tr>
<tr>
<td>Phosphate</td>
<td>2.80 ± 0.45</td>
<td>3.39 ± 0.24</td>
<td>0.006*</td>
</tr>
<tr>
<td>Alkaline phosphatase</td>
<td>192.7 ± 18.84</td>
<td>92.57 ± 8.36</td>
<td>0.000*</td>
</tr>
</tbody>
</table>

**Table (6):** Postoperative complications

<table>
<thead>
<tr>
<th></th>
<th>Adenoma (n= )</th>
<th>Hyper (n= )</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transient hypocalcemia</td>
<td>1/19(5%)</td>
<td>14/52 (27%)</td>
<td>0.036</td>
</tr>
<tr>
<td>Permanent hypocalcemia</td>
<td>0</td>
<td>0</td>
<td>NS</td>
</tr>
<tr>
<td>Transient RLN injury</td>
<td>0</td>
<td>1/52 (2%)</td>
<td>NS</td>
</tr>
<tr>
<td>Permanent RLN injury</td>
<td>0</td>
<td>0</td>
<td>NS</td>
</tr>
<tr>
<td>Recurrence/persistence disease</td>
<td>0</td>
<td>3.52 (6%)</td>
<td>NS</td>
</tr>
<tr>
<td>Mean duration of follow-up (months)</td>
<td>69.3 ± 11.5</td>
<td>60.1 ± 7.3</td>
<td>NS</td>
</tr>
</tbody>
</table>

**Table (7):** Postoperative symptoms

<table>
<thead>
<tr>
<th>Symptoms</th>
<th>No. of patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bone pain</td>
<td>1</td>
</tr>
<tr>
<td>Muscular pain</td>
<td>2</td>
</tr>
<tr>
<td>Metal status changes</td>
<td>0</td>
</tr>
<tr>
<td>Pancreatitis</td>
<td>0</td>
</tr>
<tr>
<td>Renal calculi</td>
<td>0</td>
</tr>
<tr>
<td>Metastatic calcifications</td>
<td>0</td>
</tr>
<tr>
<td>Diarrhea</td>
<td>1</td>
</tr>
<tr>
<td>Insomnia</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>10</td>
</tr>
</tbody>
</table>
Figure 3: Calcium level preoperative (mg/dL)

Figure 4: Intact PTH preoperative (pg/mL)

Figure 5: Calcium level postoperative (mg/dL)
Figure 8: Calcium level preoperative versus postoperative.

Figure 9: Phosphate preoperative versus postoperative.

Figure 10: Alkaline phosphatase preoperative versus postoperative.
Closure of the incision wound

Excision specimen

after 3 months
DISCUSSION
We reported our experience and outcomes with surgical management of tertiary hyperparathyroidism. The incidence of this disease is less than 2% in this index population. Nevertheless, it is a disease that produces debilitating symptoms in the majority of patients (7). Parathyroidectomy in patients with tertiary hyperparathyroidism is associated with a long-term cure rate of 99%. Numerous studies have reported on the incidence of adenoma as the cause of tertiary hyperparathyroidism. The incidence ranges from 0% to 32%. The incidence of single or double adenoma in our series was 30% (5). As with previous series, several of our patients were found to have asymmetric hyperplasia limited to one or two glands, whereas others had true adenomas on pathologic section (10). We did not distinguish between these two disease entities at the time of surgery because it would not have altered our surgical approach. Further, patients with either process had similar outcomes. Nevertheless, this issue raises question.

Do patients with asymmetric hyperplasia represent a group in which only one or two glands develop a persistent secondary hyperplastic response after the resolution of uremia? (9)

However, for the purposes of managing patients with enlargement of only one or two glands, distinguishing between these two potential disease entities appears to be unnecessary (8).

The incidence of postoperative complications was 2% and consisted of 1 case of postoperative transient hypocalcemia and 1 case of temporary recurrent laryngeal nerve neuropaxia. This is consistent with previous series. The incidence of postoperative transient hypocalcemia was significantly higher in the hyperplasia group. Two of these patients underwent total parathyroidectomy with autotransplantation, for which hypocalcemia is a frequent and well-recognized complication. However, in reviewing a third subset of patients (those with 3-gland disease who underwent 3.5-gland resection), there was a higher rate of hypocalcemia compared with patients with 4-
ma results in a cure rate of 100% at 3 years of follow-up. Importantly, there was no significant difference in the rate of recurrence between the adenoma and the hyper groups(6).

This surgical strategy is to perform a formal neck exploration with clinically significant tertiary hyperparathyroidism. Because most of these patients will have resolution of their hypercalcemia within this period. Thereafter, all patients with hypercalcemia are explored and the size of all four glands is evaluated to determine whether the disease is due to single or double adenoma or hyperplasia. If disease involves only one or two glands, then the enlarged glands are resected. In patients with hyperplasia, we recommend 3.5-gland resection with tagging of the remaining half-gland with a nonabsorbable, colored suture. We prefer to avoid total parathyroidectomy with autotransplantation for hyperplasia because of the high postoperative incidence of hypocalcemia and the low rate of recurrence after 3.5-gland parathyroidectomy(11). If all four glands cannot be identified? then a cervical thymectomy should be performed after complete exploration of the neck. With this strategy, we were able to locate seven ectopic glands, without having to perform a median sternotomy(12).

CONCLUSION

The medical management of tertiary hyperparathyroidism has yet to decrease the need for parathyroidectomy, suggesting that although medical such advances as calcitriol administration may improve serum levels of minerals, they have not altered disease progression. Advances in pharmacotherapy and dialysis continue, but medical management remains suboptimal. Parathyroid surgery remains an important, often necessary therapeutic option for patients with hyperparathyroidism associated with renal failure. So from this study we can conclude that the optimal treatment of tertiary hyperparathyroidism is the surgerical exision of the individual adenoma or adenomas or exision of (3.5) of parathyroid glands and transplantation of the remaining half in the sternomastoid muscle in case of hyperplasia type.


خطة البحث:

تم دراسة عدد 10 حالات مصابة بأعراض وعلامات زيادة إفراز الغدة الجاردرمية.
وتبين من الدراسة وجود عدد 7 حالات مصابة بورم او أورام بسيطة متعددة في الغدة
الجاردرمية. ووجود إصابة (عدد 3 حالات) زيادة إفراز ونشاط الغدة الجاردرمية دون
الإصابة بتورم ملحوظ بها.

وتم إجراء التحاليل والفحوصات اللازمة قبل إجراء التدخل الجراحي واشتملت
على الآتي:

1- تعيين نسبة الكالسيوم والفوسفات في الدم.
2- تعيين نسبة هرمون الباراشرمون.
3- عمل الأشعات المختلفة ومنها الأشعة العادية، الأشعة التلفزرية، الأشعة
المقطعية، الأشعة باستخدام الرنين المغناطيسي إذا اقتضى الأمر.

تم التدخل الجراحي في الحالات، تم إجراء استئصال الغدد المصاببة بالأورام
الحميدة وعددهم 7 وفي الحالات التي بها زيادة نشاط دون وجود تورمات (عدد
3 حالات) تم استئصال الغدد الجاردرمية الأربعة مع أخذ غدة واحدة منها حيث تم
تم تقسيمها إلى قسمين وآخذ قسم واحد منها حيث تم تقسيمه إلى جزئات صغيرة من
(Sternomastoid)

بعد إجراء العملية تم متابعة المريض أسبوعيا لمدة ثلاثة أشهر حيث تم إجراء
التحاليل التالية:

- الكالسيوم بالدم.
- الفوسفات بالدم.

وبعد ثلاثة أشهر من إجراء العملية تم تعيين نسبة هرمون الباراشرمون في الدم.

الخلاصة:

من هذا البحث تبين أن التدخل الجراحي هو العلاج الأمثل في حالات زيادة إفراز
الغدة الجاردرمية الثالثة حيث يتم استئصال الورم في حالات وجود الأورام أو عدد
(3) عدد جاردرمية في حالة عدم وجود ورم مع زرع النصف المنتبقي في عضلة الرقبة
(Sternomastoid muscle)

Vol. 37, No. 1 & 2 Jan., & April, 2006