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LETTER TO EDITOR

Intra-operative serum calcium monitoring compares favourably with parathyroid hormone monitoring to determine completeness of surgery for parathyroid adenoma

Dear Editor,

Hyperparathyroidism (HPT) is a common endocrine disorder. The most common causes of primary HPT are parathyroid gland hyperplasia and adenoma. HPT results in hypercalcaemia which can result in serious complications including peptic ulcer diathesis, acute pancreatitis, nephrocalcinosis, nephrolithiasis and acute neurological disorders. However many patients remain symptomless or their complications are common disorders such as hypertension, mild neuropsychiatric disorders or osteoporosis which are not readily ascribed to hypercalcaemia. This latter group is usually diagnosed unexpectedly from hypercalcaemia noted on routine mass serum electrolyte measurements. Raised serum parathyroid hormone (PTH) level indicates the cause of hypercalaemia to be HPT. Hyperfunctioning enlarged parathyroid glands can be identified by ultrasonography and/or sestamibi scintigraphy. Surgery is the only definitive treatment for primary HPT. Current practice for parathyroid adenoma surgery is focused minimal access surgery after preoperative localisation with ultrasonography/sestamibi scintigraphy. Successful or complete adenoma excision is confirmed by a rapid fall of serum PTH.[1] Minimal access parathyroid surgery affords patients a better quality of life compared to traditional bilateral neck exploration.[2]

Rapid PTH measurement is not universally available. It is done in major referral (tertiary) hospitals. Serum calcium levels are very closely regulated by PTH levels. Any fall in serum PTH level is rapidly followed by a fall in serum calcium. Calcium measurement is readily available in all medical laboratories including point-of-care electrolyte and pH measuring equipment.

We report 14 HPT patients with parathyroid adenoma (subsequently confirmed on histology) who underwent focussed small incision adenoma surgery and compared the fall of serial measurements of serum PTH and calcium for possible concurrence during adenoma excision (Table 1) (Fig. 1). We found that both PTH and calcium serum levels were reduced 10 min after adenoma excision (63% and 31% reduction respectively) and that this was statistically significant (p0.05, p0.013 respectively, t-test). This concurrent reduction was even greater after 20 min (78% and 49%). The results indicate that intraoperative serum calcium monitoring can be substituted for PTH as a tool to determine complete adenoma excision. This is in accord with a

Table 1 Mean serial pre- and intra-operative measurement of (A) PTH and (B) Calcium serum levels at different time intervals.

Comparing with 0 min	Mean	SD	*P*-value
(A) PTH n = 14			
0	108.23	123.42	
10	40.54	36.31	0.051[a]
20	24.28	25.46	0.030[a]
30	13.88	13.34	0.040[a]
(B) Calcium n = 14			
0	2.51	0.17	
10	2.40	0.22	0.013[a]
20	2.37	0.17	0.001[a]
30	2.33	0.15	0.003[a]

[a] Statistically significant.

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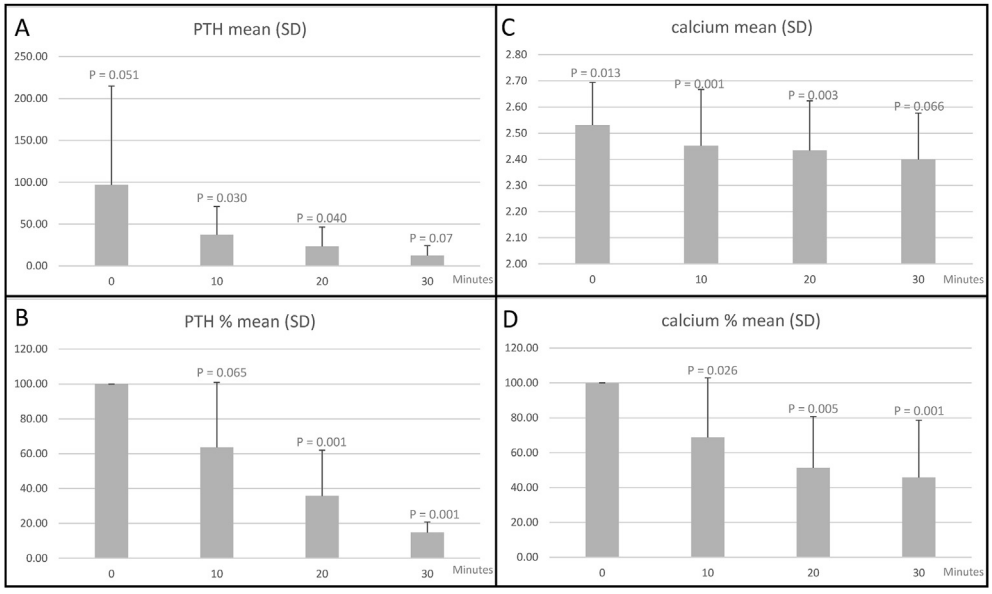

Figure 1 Serial intraoperative measurement of PTH and Calcium at different time intervals (A) Mean PTH levels (B) Percentage of PTH at different intervals relative to pre-resection level (C) Mean Calcium levels (D) Percentage of Calcium at different intervals relative to pre-resection level normalised by subtracting the value of lower level of reference value (−2.15 mmol/L).

previous report by Diaz-Aguirregoitia et al.[3] Other authors disagree with this conclusion.[4,5] However, their objection is based on a too early (10 min) post-operative serum calcium measurement when the reduction was still modest (albeit statistically significant in our study) compared to greater reduction at a later 20 min time point. To address this objection to the use of calcium monitoring we suggest that a 20 min serum calcium measurement be used as the cut-off point to determine successful adenoma excision rather than the 10 min cut-off used for PTH monitoring. This would marginally increase the operation time by 10 min but afford patients the opportunity to be operated upon in their community hospital. This would provide both cost saving as well as the benefit of emotional support of being operated upon close to their family and friends.

Declaration of Competing Interest

None.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.asjsur.2019.09.013.

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