



Can Preoperative Serum Alkaline phosphatase and Serum Calcium be used as predictors of postoperative tetany

Abstract

A total of 100 cases hyperthyroid patients were selected for this prospective study. The hyperthyroidism was confirmed by thyroid function tests and scintigraphy. Of these 100 patients 60 (60%) patients had elevated serum alkaline phosphatase (ALP) and decreased bone mineral density (BMD) and 20 (20%) patients had normal ALP and normal BMD. All 100 patients underwent total thyroidectomy. 20 patients with normal ALP did not show a shift in calcium levels and 80 patients with elevated ALP showed shift in calcium levels (1 to 1.5 gm%) 40 (40%) patients with their calcium levels less than 9.5 gm% and elevated ALP developed carpopedal spasm in postoperative period. Hence we conclude that the combination of low normal calcium (< 9.5%) and elevated ALP has a high predictive value for postoperative carpopedal spasm.

Key words

Hyperthyroidism, serum alkaline phosphatase, hypocalcaemia, carpopedal spasm (tetany), hungry bones, bone mineral density.

Objective

Some patients with hyperthyroidism develop hypocalcaemia in the postoperative period. The aim of the study is to predict the patients who would develop postoperative hypocalcaemia and the role of ALP in predicting the same.

Patients and Methods

100 patients were selected (Male: Female-10:90) All patients had clinical, hormonal (T3, T4, TSH) and scintigraphic features of hyperthyroidism. 80 patients with elevated ALP and 10 patients had normal ALP. None of the patients had liver function abnormalities and none of the female patients were pregnant. Serum calcium and phosphorus levels were estimated in all patients. All patients with elevated ALP who underwent BMD were osteopenic. Patients with normal ALP had normal BMD. All patients were treated with antithyroid drugs (carbimazole and propranolol) for varying periods until they were euthyroid. All patients underwent total thyroidectomy and their ALP was estimated in the postoperative period along with calcium and phosphorus.

Results:

All patients in the study group with elevated ALP showed a fall in the ALP level after 48 hours of surgery. They also showed a fall in the serum calcium level(1-2mg%). Patients who had their postoperative calcium <9.5mg% developed postoperative tetany (40 patients-4 males and 36 females) .

Total number of patients :100

ALP	Elevated in 80	Normal in 20
BMD	osteopenic	Normal
Preop.S.Calcium	<9.5mg %in 40	9.5-11mg% in 60
P.O. Ca shift	All	None
Tetany	40	None

Discussion

Serum ALP is an enzyme secreted by bone, liver, placenta and intestine. The bone component is secreted by osteoblasts . It has a half life of 40 hours. Thyroxine has direct effect on osteoblast since they possess the receptors for it. These activated osteblasts secondarily stimulate osteoclasts to produce bone resorption.

To establish bone involvement the bone isoenzyme should be estimated. If the bone isoenzyme cannot be estimated then liver function tests must be done to rule out liver function abnormality since ALP is elevated in biliary obstruction. Pregnancy should be ruled out in females. The bone isoenzyme is also elevated in conditions like fracture healing,secondary deposit ,during growth,etc. Hyperthyroid patients with elevated ALP and low normal calcium (<9.5mg%)require preoperative preparation with calcium and Vitamin D3 along with antithyroid drugs to elevate the serum calcium levels.Vitamin-D3 is mandatory because there is decreased absorption of calcium due to decreased PTH level in hyperthyroidism. If serum calcium can be brought down to high range of normal (10-11mg%) the incidence of tetany due to hungry bones can be brought down.

Conclusion:

It is seen that ALP can be used as a predictor of metabolic bone disease in hyperthyroid patients. All these patients demonstrated a shift in the serum calcium (1 to 2mg%) in the postoperative period due to hungry bones.

All patients who developed postoperative tetany had their calcium <9.5mg% along with elevated ALP. ALP can be used as a predictor for bone involvement in hyperthyroid patients. Along with calcium ALP can be used to predict patients who would develop postoperative tetany.

References

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