

Effects of surgery on outcome of primary hyperparathyroidism

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Introduction

Primary hyperparathyroidism is a disease with effects on many organ systems [1]. The only available curative treatment is surgery with removal of pathological parathyroid glands. Some symptoms and organ manifestations are modifiable through surgery [1], whereas others are not [2].

Available studies

Most studies have been observational, and few have been randomised controlled trials. Not all end-points have been addressed by the available studies.

Outcomes

BMD

An observational study of before-and-after design in 34 patients undergoing surgery for primary hyperparathyroidism in the US showed an increase in BMD of the lumbar spine, femur, and forearm four years after surgery [3].

A further observational study showed that among 61 patients who had undergone parathyroid surgery and 60 conservatively managed patients with primary hyperparathyroidism BMD increased in the lumbar spine and femoral neck among the surgically treated, while no change in forearm BMD was seen [4]. BMD remained stable among the conservatively managed patients [4].

One observational before-and-after study showed that BMD of the lumbar spine and femur tended to normalise after surgery, while the proximal radius BMD tended to increase but not the the expected levels [5]. The lack of normalisation of forearm BMD was observed up to 17 years after surgery [6].

A randomised controlled trial has shown an increase in BMD of the lumbar spine [7; 8] so that lumbar spine BMD was higher in surgically treated than conservatively treated after two years [7; 8]. In the femoral neck an increase was seen among the surgically treated, but the femoral neck BMD was not significantly higher among the surgically treated after two years compared to the conservatively managed patients [7; 8].

A randomised controlled trial (25 surgically treated and 28 conservatively managed patients) showed no difference in lumbar spine, femoral neck, and forearm BMD for a period of up to two years of follow-up [9]. However, the rate of change per year was reported to be significantly different between surgically treated for total hip and femoral neck BMD (increase in surgically treated, decrease in conservatively managed) [9].

A small randomised controlled trial showed that surgery (n=13) was better in terms of BMD outcome than etidronate (n=9) [10]. However, both treatments provided increases in spine BMD [10].

Fracture

An increased risk of fractures was seen up to 10 years prior to the time of diagnosis in patients later undergoing surgery than in the general population in an observational study [11]. Following surgery, the risk of fractures declined to that of the background population more than one year after surgery [11]. However, a similar pattern was seen in conservatively managed patients in another observational study [12]. As a consequence, no difference in overall risk of fractures was seen in an unadjusted analysis [12]. More than 10 years following surgery, an increase in the risk of forearm

fractures was seen [11].

The risk of fractures was lower among patients later undergoing surgery than among conservatively managed patients in an observational study [1]. However, after adjustment overall fracture risk after diagnosis was lower among surgically treated patients than among conservatively managed patients [1]. A significant decline was seen for hip and upper arm fractures, but not for other types of fractures among surgically treated patients compared to conservatively managed patients [13].

Myocardial infarction

An increased risk of myocardial infarctions have been shown up to 10 years prior to diagnosis in patients later under surgery for primary hyperparathyroidism in an observational study [14]. More than one year after surgery the risk of myocardial infarctions declined to the same level as among the controls [14]. However, when comparing patients undergoing surgery for primary hyperparathyroidism with conservatively managed patients, no difference in the risk of myocardial infarction was present after diagnosis [1].

Cardiovascular risk factors

A randomised controlled study failed to show any effects of surgery over conservative management on blood pressure, cholesterol levels, and other markers of cardiovascular risk [8].

Hypertension and blood pressure.

A randomised controlled study failed to show any effects of surgery over conservative management on blood pressure [8]. A similar finding was done in an observational study on hypertension [2]. Patients with primary hyperparathyroidism tend to have higher maximal systolic blood pressure during exercise than controls, but this difference does not disappear after surgery [15].

Echocardiographic measures

An observational study showed a trend towards an decrease in left ventricular hypertrophy (interventricular septum and posterior wall thickness) after surgery for primary hyperparathyroidism [16]. Another observational study failed to show significant changes in echocardiographic measures after surgery for primary hyperparathyroidism [15] except for a decrease in ejection fraction and an increase in end-systolic diameter [15]. However, a significant decrease was seen in extrasystolic beats before surgery compared to controls, and this difference disappeared after surgery [15].

Kidney stones

An observational study showed that among 20 patients with kidney stones, 6 of the 8 who did not undergo surgery had recurrent kidney stones, while none of the 12 surgically treated had recurrent kidney stones [4] ($p < 0.01$).

An observational cohort study in patients who had undergone surgery for primary hyperparathyroidism showed an increased risk of kidney stones up to 10 years before the diagnosis of hyperparathyroidism [17]. It took up to 10 years after surgery before the risk of kidney stones decreased to the same level as in the general population [17].

A cohort study comparing surgically and conservatively managed patients with primary hyperparathyroidism showed an increased prevalence of kidney stones preoperatively in patients later undergoing surgery than among conservatively treated (OR=2.49, 95% CI: 1.93-3.23) [1]. Even after adjustment for prevalent kidney stones at the time of diagnosis, patients later undergoing surgery had more kidney stones than conservatively managed patients [1].

Ulcers

An observational study showed fewer gastroduodenal ulcers after surgery in surgically treated compared to conservatively managed patients [1].

Quality of life and other parameters

A randomised controlled trial showed poorer quality of life in patients with primary hyperparathyroidism compared to the general population [7], but no benefit of surgery was shown over conservative management [7].

A randomised controlled trial showed no overall difference between surgically treated and conservatively managed patients in quality of life, but the annual change tended to be different for social functioning and emotional problem [9].

A randomised controlled trial showed improvements in 6 minute walking distance, but no change in fifty foot walk and repeated sit to stand times [18] in surgically treated (n=9) than in conservatively treated (n=9) [18].

Survival

Patients undergoing surgery seemed to have a lower risk of death than conservatively treated patients in observational studies [1; 19].

On Danish study has shown a limited excess of cancers among patients with hyperprathyroidism, with an excess of multiple myeloma among patients with primary hyperparathyroidism [20].

Among patients with secondary hyperparathyroidism, no excess of malignancies was observed [20].

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