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ORIGINAL ARTICLE

Radioguided Surgery in Primary Hyperparathyroidism: Results and Correlation With Intraoperative Histopathologic Diagnosis☆

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Primary hyperparathyroidism;
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Technetium Tc-99m sestamibi;
Minimally invasive surgical procedures;
Gamma probe

Abstract
Introduction and objectives: Radioguided surgery is a minimally invasive surgical technique for the treatment of primary hyperparathyroidism. The goals of our study were to evaluate the rate of success and compare the results with intraoperative histological analysis.
Methods: We retrospectively studied 84 patients with primary parathyroidism who had undergone radioguided surgery. All the patients had a positive parathyroid scintigraphy prior to surgery. An intravenous injection of Tc-99m sestamibi was administered before surgery, and radioguided location of the pathologic parathyroid tissue was performed using an intraoperative gamma probe, applying the ''20% rule''. All resected specimens underwent intraoperative histologic analysis. All patients were followed up for at least 6 months. Positive predictive values of both parathyroid scintigraphy and cervical ultrasonography were also compared.
Results: Radioguided surgery success rate was 99%. Sensitivity, specificity, positive and negative predictive values for gamma probe were 99%, 73%, 97% and 89%, respectively. After surgery, 83 of 84 patients were eucalcaemic (99%) and parathyroid hormone normalised in 77 of 84 patients (92%). Ultrasonography showed low positive predictive value (41%) when compared with scintigraphy.

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Conclusions: Radioguided surgery is a minimally invasive surgical technique with excellent results for the treatment of primary hyperparathyroidism and could replace both intraoperative histological analysis and intraoperative parathyroid hormone assay. Further studies are needed to confirm these findings.

PALABRAS CLAVE
Hiperparatiroidismo primario;
Cirugía radiodirigida;
Neoplasias paratiroideas;
Tecnecio Tc-99m sestamibi;
Técnicas de cirugía mínimamente invasiva;
Sonda gammadetectora

Cirugía radioguiada en el hiperparatiroidismo primario: resultados y correlación con el diagnóstico anatomopatológico intraoperatorio

Resumen
Introducción y objetivos: La cirugía radioguiada es una técnica de tratamiento quirúrgico mínimamente invasivo del hiperparatiroidismo primario. Los objetivos de este estudio fueron estudiar el porcentaje de éxito de esta técnica y realizar una comparación de la misma con el estudio histológico intraoperatorio.
Métodos: Estudiamos retrospectivamente a 84 pacientes con hiperparatirodismo primario con gammagrafía paratiroidea positiva. Se administró una dosis de Tc-99m sestamibi previa a la cirugía y se utilizó una sonda gammadetectora intraoperatoria para detectar el tejido paratiroideo anómalo, siguiendo la «regla del 20%». En todos los casos se realizó estudio anatomopatológico intraoperatorio y seguimiento clínico y analítico durante al menos 6 meses. Asimismo, se comparó el valor predictivo positivo de la ecografía cervical respecto a la gammagrafía paratiroidea.
Resultados: El porcentaje de éxito de la cirugía radioguiada fue 99%. La sonda gammadetectora intraoperatoria tuvo una sensibilidad, especificidad, valores predictivos positivo y negativo respecto al estudio histológico intraoperatorio de 99, 73, 97 y 89%, respectivamente. La calcemia se normalizó en 83 de 84 pacientes (99%) y la paratohormona se normalizó en 77 de los 84 pacientes (92%). La ecografía mostró un bajo valor predictivo positivo (41%) comparada con la gammagrafía.
Conclusiones: La cirugía radioguiada es una técnica con excelentes resultados en el tratamiento quirúrgico mínimamente invasivo del hiperparatiroidismo primario y podría sustituir tanto al estudio anatomopatológico intraoperatorio como a la determinación intraoperatoria de paratohormona. Esta última posibilidad debe ser demostrada en futuros estudios.

Introduction

Surgical treatment for primary hyperparathyroidism (pHPT) has evolved over the last few decades towards less aggressive but equally effective approaches. Largely thanks to greater diagnostic precision provided by preoperative location techniques, bilateral cervical exploration for the location of parathyroid glands has been replaced by minimally invasive parathyroidectomy, with many advantages ensuing including: fewer complications and sequelae, shorter time in surgery and shorter hospital stay, shorter postoperative recovery period, less postoperative pain, better cosmetic outcome and greater patient satisfaction.[1,2] There are several variants of minimally invasive parathyroidectomy, the most frequently used being unilateral cervical exploration (guided or unguided by imaging techniques), endoscopic and video guided techniques and radio guided surgery (RS).

RS was described by Norman and Chheda[3] in 1997 and its advantages compared with other techniques of minimally invasive parathyroidectomy are[4]: shorter time in surgery, selective treatment of anomalous ectopic glands, reduction in the number of persistent or recurrent pHPT on the assurance of complete removal of the adenoma and the possibility of carrying out less aggressive surgery in patients with previous thyroid or parathyroid surgery, when endoscopic and video guided parathyroidectomy was totally contraindicated.[5]

The objectives for our study were to:

1. Assess the successful outcome and clinical outcome percentage of RS as a surgical technique for pHPT.
2. Determine the capacity of intraoperative counting ratio to discriminate between the parathyroid origin or non parathyroid origin of the resected tissues and therefore verify whether the use of RS would mean foregoing an