**ABSTRACT**

**Objectives:** We sought to examine the trends in surgical volume, demographics, and outcomes of parathyroidectomies in the inpatient and outpatient settings.

**Study design:** Analysis of comprehensive datasets of inpatient and outpatient surgical procedures in the state of California.

**Methods:** All parathyroid surgeries performed in California from 2005 to 2011 were examined. Cases were identified through ICD-9-CM and CPT codes for parathyroidectomy. Post-operative complications were also identified through review of relevant ICD-9-CM codes.

**Results:** 13,096 inpatient and 8,788 outpatient parathyroidectomies were performed between 2005 and 2011. The annual case-volume increased by 46% (p<0.001) and the population-adjusted rate for parathyroid surgeries increased by 256% (Figure 2).

**Conclusion:** The volume of parathyroidectomies increased between 2005 and 2011. The case-volume and percentage of patients with CKD increased in both settings, while the percentage of patients with chronic kidney disease or on hemodialysis increased from 0.2% to 0.8% (p<0.001). Mortality was very uncommon (0.2% inpatient and 0% outpatient), and its rate did not change over time (p=0.5 inpatient and p=0.9 outpatient).

**DISCUSSION**

The surgical volume of parathyroidectomies has increased between 2005 and 2011. While about one fifth of surgeries were performed in the outpatient setting in the beginning of the study period, this proportion increased to more than half of all surgeries by the end of the studied period. This shift further proves the influence of increased utilization of minimally invasive parathyroid surgery techniques on the operation setting and supports the previous surveys, which showed a transition towards outpatient surgeries [1,4].

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**METHODS AND MATERIALS**

- The California Ambulatory Surgery and Inpatient Discharge Data sets from 2005 to 2011 were queried. Parathyroid surgery cases were identified and extracted using the ICD-9-CM procedure codes 06.81 and 06.89 for the inpatient data and using the Current Procedural Terminology (CPT) codes 60500, 60502, and 60505 for the outpatient data.
- Diagnosis of chronic kidney disease (CKD) and hemodialysis, autoimplantation, PTH monitoring, and post-operative complications were identified through review of relevant ICD-9-CM and CPT codes.
- The annual surgical volumes and population-adjusted surgery rates (per 100,000 California residents) were calculated and their trends over years were graphed. In addition, demographic, post-op complication, principal payer, admission duration, hospital charges, and disposition data were evaluated over the studied period.
- Linear regression was used to analyze the trends over time.

**RESULTS**

- There were 13,096 inpatient and 8,788 outpatient parathyroid surgeries performed in the state of California, amounting to a total 21,884 surgeries during 2005-2011. The overall annual surgical volume for all surgeries increased from 2,604 to 3,805 (p<0.001) and the population-adjusted rate from 7.3 to 10.1 (p<0.001) during 2005-2011.
- The annual surgical volume of inpatient surgeries decreased (p=0.01) while the annual surgical volume for outpatient surgeries increased (p<0.001) (Figure 1). The population-adjusted rate for inpatient surgeries also declined by 23% while the adjusted rate for outpatient surgeries increased by 256% (Figure 2).
- Overall, age distribution of patients was 0.3% on 1-17 year olds, 4.5% on 18-34 year olds, 57.0% on 35 to 64 year olds, and 38.2% on 65 year old and over. Of all patients, 74.6% were females and 16.6% were non-Caucasian. The principal payer was Medicare in 36.4%, Medicare in 5.2%, private insurance in 54.3% and other in 4.1%.
- Further analysis of the inpatient data revealed that 13.9% of the surgical cases were complete and 86.1% were partial parathyroidectomies and autoimplantation was performed in 6.2%; none of these percentages changed over time. The percentage of patients with chronic kidney disease or on hemodialysis increased from 7.8% (160 cases) in 2005 to 19.0% (312 cases) in 2011, but this change was not statistically significant (p=0.06). The median length of inpatient stay remained 1 day (p=0.06) while total charges increased from $19,886 to $34,936 (p<0.001).
- Further analysis of the outpatient data revealed that primary surgery comprised 96.4%, re-operation comprised 2.7%, and mediastinal/transsthoracic approach comprised 0.9% of all outpatient surgeries; none of these rates changed over time. Autoimplantation was performed in 1.8% of all surgeries. The percentage of patients with chronic kidney disease or on hemodialysis increased from 1.4% in 2005 to 4.2% in 2011 (p<0.003). PTH monitoring use increased from 8.1% in 2005 to 18.0% in 2011 (p=0.01).

**CONCLUSIONS**

- The case-volume of parathyroidectomies increased between 2005 and 2011.
- These surgeries are increasingly being performed in the outpatient setting. There was a fourfold increase in the outpatient volume and modest decrease in the inpatient surgical volume.
- The percentage of patients with CKD increased significantly in both the outpatient and inpatient settings.

**REFERENCES**