The anatomical basis for preserving the blood supply to the parathyroids during thyroid surgery, and a review of current technologic advances

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Background

Devascularization of the parathyroid glands is considered the most common mechanism for iatrogenic hypocalcemia, a frequently seen complication of both total and completion thyroidectomy procedures.

Much has been written about iatrogenic hypoparathyroidism, but few papers have precisely delineated the arterial supply of the parathyroid glands and the common anatomical variations that may impact parathyroid preservation during thyroid surgery.

Hypocalcemia following thyroidectomy can result in significant complications. While inadvertent removal of the parathyroid glands during thyroid surgery can occur, devascularization of the parathyroids is generally accepted as the most common mechanism for iatrogenic hypocalcemia.

Introduction

New techniques have been utilized in an effort to identify, preserve, and assess the viability of the parathyroid glands during surgery. While these technologic advances can be a helpful tool in thyroid surgery, they do not replace the surgeon's intimate knowledge of parathyroid vascular anatomy.

There are only two studies in the literature that have accurately defined the arterial supply of the parathyroid glands.

Our manuscript synthesizes contemporary techniques of parathyroid identification and preservation as well as the description of parathyroid vasculature and its variations. We aim to increase a surgeon's familiarity with parathyroid anatomy and accordingly reduce the risks of hypoparathyroidism.

Methodology

Our manuscript offers a comprehensive review of the only two anatomic studies published in the medical literature focusing on parathyroid vasculature. We additionally examine modern techniques of parathyroid identification, preservation, and classification.

Findings

A surgical technique that preserves the parathyroid arteries is vital to preserving the viability of the parathyroid gland(s) during thyroid surgery. In 1907, Halsted and Evans described a technique of ligating the distal branches of the thyroid arteries beyond the origin of the parathyroid arteries, a technique termed *ultra-ligation*. In 1982, Flament et al.. reported three distinct anatomical variations of the parathyroid arteries which place the parathyroid blood supply at risk for devascularization during thyroid surgery. Our review also highlights novel techniques that aid surgeons in identification and assessment of the parathyroid glands.

Conclusion

Recognition of the variations of parathyroid anatomy and their potential to lead to devascularization aids thyroid surgeons in their pursuit of parathyroid preservation. An awareness of the variety of modern parathyroid identification and preservation techniques can assist surgeons to achieve this goal.

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