Thyroglossal Duct Cyst Associated with Xanthogranulomatous Inflammation

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Abstract Xanthogranulomatous inflammation (XGI) is an uncommon destructive chronic inflammatory process mainly occurring in the kidney and gallbladder, characterized by the accumulation of foamy histiocytes, multinucleated giant cells (Touton type), cholesterol clefts and chronic inflammatory cells. The head and neck region is an uncommon site for XGI. This type of inflammatory reaction has been defined in branchial cleft cyst, salivary gland tumors following fine-needle aspiration biopsies, Rathke's cleft cyst in the pituitary gland, and colloid cyst in the 3rd ventricle. We present herein a unique case of ruptured thyroglossal duct cyst leading to XGI, characterized by an infiltrative subcutaneous central neck lesion, clinically mimicking a thyroid carcinoma. In addition, we also summarize current insights into the pathogenesis of XGI in the head and neck region.

Keywords Thyroglossal duct cyst · Xanthogranulomatous inflammation · Head and neck

Introduction

Xanthogranulomatous inflammation (XGI) is an uncommon destructive chronic inflammatory process mainly occurring in the kidney and gallbladder [1, 2]. XGI has also

been described in other various locations including bone, urinary bladder, prostate, epididymis, vagina, endometrium, ovary, fallopian tubes, pancreas, breast, urachus, appendix vermiformis and colon [3–10]. The head and neck region is a relatively an uncommon site for XGI [11]. Fine-needle aspiration biopsy (FNAB)-related XGI have been described in patients with salivary gland tumors [12]. Recently, XGI has also been shown to occur in the setting of a branchial cleft cyst mimicking a cystic malignant neoplasm in the neck [11]. While both congenital and neoplastic entities may present with cystic neck lesions, thyroglossal duct cyst is the most common congenital cystic lesion occurring in the central neck [13, 14]. Well-defined complications of thyroglossal duct cysts include rupture, infection, fistula formation and transformation to malignancy [14, 15]. We describe here a unique case of ruptured thyroglossal duct cyst leading to XGI.

Case Presentation

A 40-year-old male patient presented with a history of progressively growing suspicious central neck mass during the past few years. Physical examination revealed a 3 cm mass located in the anterior midline neck that was elevated with swallowing. Computerized tomography scan showed a 4.0 × 2.7 × 2.4 cm hypodense lesion located within the paramedian infrahyoid neck. No other abnormality was detected in the neck. Subsequently, the patient underwent fine needle aspiration (FNA) biopsy, which showed abundant anucleated squames and mature squamous epithelium consistent with a cystic squamous lesion. Given the large size and rate of growth of this lesion, he underwent a Sistrunk operation. Gross examination justified the presence of a 3.0 cm cystic lesion surrounded by a soft tissue

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component showing continuity with the hyoid bone. Microscopic examination revealed that the cystic lesion was lined predominantly by bland squamous epithelium and contained abundant proteinaceous material (Fig. 1). The underlying soft tissues revealed scattered thyroid follicles admixed with an inflammatory process, characterized by foamy histiocytes as well as Touton type giant cells (cells of macrophage derivation characterized by a ring of nuclei surrounded by a large foamy cytoplasm) (Fig. 1). There were regions of granulation tissue consistent with previous cyst rupture. There was no evidence of malignancy. Fungal or mycobacterial microorganisms were not detected with Periodic-Acid-Schiff, Giemsa and Ehrlich Ziehl Neelsen stains. The diagnosis of a ruptured thyroglossal duct cyst

with XGI was rendered. The patient had no complications on clinical follow-up.

Discussion

Cystic lesions of the head and neck region encompass a variety of embryological and neoplastic disorders including epidermoid inclusion cyst, thyroglossal duct cyst, branchial cleft cyst, teratoma, dermoid cyst, secondary squamous cell carcinoma with cystic change, cystic papillary thyroid carcinoma, and other lesions. Age, clinical history, and anatomic location of the lesion often provide a roadmap for practicing pathologists to triage the appropriate differential

Fig. 1 Histopathological examination of the Sistrunk specimen revealed a ruptured cystic lesion lined predominantly by bland squamous epithelium and contained abundant proteinaceous material along with cholesterol crystals and macrophages (a–c). The

surrounding connective tissue showed scattered thyroid follicles (d) admixed with an inflammatory process characterized by foamy histiocytes as well as Touton type giant cells (e, f)

diagnoses. FNAB is used to narrow down the differential diagnoses; however, those with suspicious features for malignancy (e.g. progressive growth, suspicious radiologic findings, and history for a previous malignancy) require histopathologic examination.

Thyroglossal duct cysts typically present with painless and mobile masses located in the anterior midline neck along the embryologic descend line of the thyroid gland [13, 14]. The lining of thyroglossal duct cysts consists of ciliated pseudostratified columnar or cuboidal cells with variable squamous epithelium. The lumen may contain colloid, cholesterol, foamy or hemosiderin laden macrophages admixed with cellular debris and neutrophils, lymphocytes, and rarely multinucleated giant cells [13]. In some cases, complications such as rupture, infection, and formation of fistula to the underlying skin can be observed [15]. Furthermore, well differentiated thyroid carcinoma (often papillary thyroid carcinoma) or rarely squamous cell carcinoma have been encountered in the background of these lesions [14]. A hard, fixed, irregular and rapidly growing mass without clinical signs of inflammation as well as the presence of a solid mural component or calcifications on ultrasonography may be indicators of transformation to malignancy [14].

XGI is an uncommon type of inflammation that is typically associated with many conditions such as pyelonephritis, cholecystitis, Erdheim–Chester disease, and malakoplakia [1, 6, 11]. It has also been shown that FNAB, suture material, and neoadjuvant chemotherapy may also result in XGI [6, 11, 16]. This pattern of inflammation is indeed extremely rare in the head and neck region. In addition to post-FNAB related XGI in salivary glands [12], this is typically restricted to some cystic lesions including branchial cleft cyst in the neck, Rathke’s cleft cyst in the pituitary gland, and colloid cyst in the 3rd ventricle.

Similar to other head and neck lesions, the presented case is an example of a ruptured cystic head and neck lesion associated with XGI. Could the rupture phenomenon be explained by a previous manipulation like FNAB? It is of note that the presented case and previous reports on branchial cleft cyst and XGI in salivary glands have a common history of FNAB. XGI may be attributable to a previous FNAB; however, the possibility of a spontaneous rupture prior to FNAB should also be considered. In the presented case a growing neck mass with worrisome radiological features were identified prior to FNAB and this may be due to a spontaneous rupture. While this issue remains unclear in our case, it is of note XGI associated with ruptured Rathke’s cleft cysts in the pituitary gland are unassociated with previous manipulations.

Why does XGI occur in association with cystic lesions in the head and neck region? Although some theories have been proposed, the pathogenesis of XGI remains largely

unknown. The content of a ruptured cyst and cyst epithelium in contact with the surrounding tissue have been suggested to cause XGI through various mechanisms including activation of monocytes/macrophages [17–19]. Similar to the presented case, patients with ruptured Rathke’ cleft cyst also result in reactive xanthogranulomatous hypophysitis. It has been shown both Rathke cleft and thyroglossal duct cysts contain variable cholesterol [13, 20–23]. In our case, blood lipid profile along with the exact cyst lipid content is not available. However, in light of the previous discussion, one can speculate that cholesterol content seems to be an essential trigger in the activation of monocyte–macrophage derived cells in the surrounding tissue. Indeed, cholesterol is a known activator of the danger sensing structure, NLRP3 inflammasome, in macrophages, which orchestrates production of certain inflammatory cytokines [24]. In xanthogranulomatous pyelonephritis, increased monocyte chemotactic protein-1 expression has been suggested to play an important role in its pathogenesis [25]. A monocyte/macrophage typically transforms into foamy macrophage under the stimulus of IL-6, TNF-alpha and M-CSF [26]. It has been shown that some degenerated foamy macrophages incorporate with each other and transform into the Touton type multinucleated giant cells in chronic processes; however, key factors in this transition have not yet been revealed [26, 27]. Few cases with so-called “cholesterol granulomas” characterized by cholesterol-crystal with a reactive inflammatory reaction, including foreign body type multinucleated giant cells, have been reported in association with ruptured thyroglossal duct cyst [21, 22]. The presence of foamy macrophages along with Touton-type giant cells is the key feature distinguishing XGI. However, the former also belongs to the spectrum of reactive changes associated with cyst rupture.

Touton-type giant cells have also been identified in other lesions including juvenile xanthogranuloma, papular xanthoma, xanthelasma, necrobiotic xanthogranuloma, Rosai–Dorfman disease, Erdheim–Chester disease [11, 28]. The distinction between thyroglossal duct cyst with XGI and xanthogranulomatous cutaneous disease can be made by the identification of underlying cystic disease along with clinical findings.

Conclusion

XGI is a rare entity, especially in the head and neck area. To our knowledge, we report the first case of a ruptured thyroglossal duct cyst leading to XGI that can simulate a malignancy at the clinical level. While the lipid content of these cysts may play an essential role in the formation of reactive XGI, it is important to remember this phenomenon

when a clinical suspicion for malignancy is raised in a patient with thyroglossal duct cyst.

Conflict of interest The authors declare that they have no conflict of interest.

Ethical standard This case report does not contain any research studies with human participants or animals performed by any of the authors.

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