Complex endocrine pathology discovered during investigations performed after politrauma - forensic implications

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Abstract: Assault victims can develop multiple complications from physical and psychological damage to aggravation of previous medical conditions, with many forensic consequences. A 51-year male, known with type 1 diabetes mellitus and autoimmune hypothyroidism, was the victim of a traumatic assault on the street. The patient had multiple bruises but no fractures. The bruises healed normally but anterior cervical and abdominal pain persisted for more than 2 weeks so he was referred for further investigation. The ultrasound examination suggested a small hemorrhage in previously unknown thyroid nodules and also in a newly discovered adrenal mass. Thyroidectomy was recommended and the pathological examination diagnosed squamous metaplasia. After a complete hormonal evaluation, the patient also underwent unilateral adrenalectomy and a benign corticoadenoma was found. A traumatic event may contribute to the diagnosis of otherwise asymptomatic or even unusual pathology such as Hashimoto thyroiditis (HT)-associated macronodular thyroid disease involving a squamous metaplasia associated with an adrenal non-functioning tumor. If physical or psychological stress may play a pathogenic role for these co-morbidities is still a matter of debate.

Key Words: traumatic assault, Hashimoto thyroiditis; thyroid nodule; squamous metaplasia, adrenal tumor.

Traumatic assaults can lead to multiple complications from physical to psychological damage (anxiety, depression, alcohol abuse, etc.), all with significant forensic implications [1, 2]. Apart from the direct effects of the traumatic event, aggravation of previous pathological conditions may occur as a consequence of physical or psychological trauma [1, 2]. We present a diabetic male known with autoimmune hypothyroidism (secondary to Hashimoto’s thyroiditis, HT), diagnosed soon after an assault with macronodular thyroid disease and an adrenal tumor, both suggestive of potential posttraumatic local hemorrhages. The posttraumatic context leading to the discovery of the thyroid and adrenal masses posed significant problems for the differential diagnosis. Both lesions could have occurred secondary to posttraumatic hemorrhage. Equally, as thyroid and adrenal nodules are frequent conditions, the traumatic event could well have been merely revelatory for pre-existing unknown endocrine pathology. Extensive investigations and aggressive management were needed in order to clarify this dilemma with significant forensic implications.

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A 51-year male was the victim of a traumatic assault on the street. He denied any alcohol abuse. Following the trauma, the patient had multiple bruises (at the level of thorax, abdomen, and anterior region of the neck) but no fractures. The bruises healed normally but the anterior cervical and abdominal pain persisted more than 2 weeks so he was referred for further investigation. His family history was negative and his personal medical history revealed a 20 years history of type 1 diabetes mellitus, arterial hypertension and Hashimoto’s thyroiditis (HT) with primary hypothyroidism (under adequate replacement therapy with levothyroxine) in the last 3 years. The thyroid ultrasound performed one
year previously had revealed no thyroid nodules. The thyroid ultrasound exam performed soon after the trauma described multiple inhomogeneous thyroid nodules. The abdominal ultrasound revealed a unilateral adrenal mass with mixed structure, suggestive for post-traumatic small intraadrenal haemorrhages. The patient was referred to a tertiary center of endocrinology. On admission, the patient had nonspecific compressive complaints in the neck area and a choking sensation. The thyroid ultrasound confirmed a diffuse inhomogeneous nodular pattern with several thyroid macronodules (Fig. 1A+B) and a small left laterocervical adenopathy (Fig. 1C). Euthyroidism (under proper thyroid replacement treatment for primary hypothyroidism) and extremely high antithyroperoxidase (ATPO) levels were found (Table 1), consistent with the diagnosis of HT. The computed tomography (CT) examination of the neck revealed large goiter, with micro- and macronodular lesions (Fig. 2).

The diabetes mellitus was inadequately controlled (Table 1), despite pretraumatic adequate values. The abdominal contrast CT confirmed the presence of a large right adrenal tumour (Fig. 3). The tumor was non-functional (Table 1).

The fine needle aspiration biopsy (FNAB) of the thyroid did not confirm the presence of the hemorrhage but described the characteristic lymphocytic infiltration of HT with atypical micro-meso-follicular cells. Total thyroidectomy was performed. The pathological diagnosis was chronic thyroiditis with extensive fibro-lymphocytic components and areas of squamous metaplasia. After recovery, right laparoscopic adrenalectomy (mainly due to the large tumor mass) was performed without any incidents. The pathologic report showed a benign cortical adenoma. The patient was discharged with the recommendation to continue the thyroid replacement treatment as well as his hypoglycemic and antihypertensive medication. Psychological and endocrine follow-up was further recommended.

**DISCUSSION**

This case raised a number of differential diagnosis and forensic issues related to the posttraumatic context in which the tumoral endocrine pathology was discovered.
Traumatic hemorrhage within the thyroid gland has been rarely reported [3]. Despite frequent spontaneous resolution in milder cases with conservative management, some require surgery for compressive symptoms [3, 4]. In contrast, traumatic (or even spontaneous) hemorrhage into preexisting thyroid nodules is a relatively frequent event, mostly without serious consequences and overall good prognosis. However, in rare cases, large hemorrhages can result in massive neck swelling and even acute respiratory failure [5]. In our case, the previously undocumented thyroid nodules (in a patient with regular endocrine follow-up for primary hypothyroidism) raised the initial suspicion of traumatic thyroid gland hemorrhage. The complex findings described at both the ultrasound and CT examination indicated the need for fine needle aspiration cytology. The atypical cytologic features described at FNAB further indicated surgery as optimal management. An additional reason to favor thyroid surgery in our case was that the macronodular aspect is unusual in HT cases (frequently characterized by diffuse, heterogeneous hypoechogenicity, with pseudonodular pattern). Furthermore, recent data reveal a potentially higher risk of papillary thyroid cancer in HT-associated- thyroid macro nodules (larger than 1 cm) [6]. The pathological examination of the surgical specimen did not confirm trauma-related hemorrhage but described a rare finding: HT-associated squamous metaplasia (otherwise not found in a normal thyroid gland) [7-9]. This lesion had not been identified at FNAB: because HT mimics a variety of other cytological lesions [7-9], aspiration cytology is frequently misleading in HT cases. In conclusion, despite many initial clues pointing toward posttraumatic thyroid hemorrhage resulting in mixed thyroid nodular areas, our patient harboured an atypical nodular thyroid lesion and the recent traumatic event only had a revelatory role related to the previously unsuspected thyroid pathology. Whether the traumaism can be responsible for the aggravation of previous pathology is debatable. Our case showed extremely high values of anti-thyroperoxidase ATPO antibodies. Increased psychological stress (such as that experienced after a violent traumatic event) may be involved in the worsening of autoimmune-related symptoms [10-12]. A highly active autoimmune background was certainly present in our case: the association of HT and type 1 diabetes mellitus is characteristic for the autoimmune polyglandular syndrome type 3, a condition with complex autoimmune pathogenesis involving both T-cell and B-cell pathways [13]. However, the serum concentration of ATPO does not have prognostic value in HT so, even if the recent trauma did trigger additional increase of the ATPO levels, this is unlikely to have clinical relevance.

More significantly from the clinical point of view was the high blood glucose profile in the context of previously controlled diabetes mellitus. This is likely to be related to the significant, prolonged stress associated with the traumatic event [14].

Another issue deserving further study in traumatized patients is the best imaging technique to be used, according to the injured organ. For the thyroid, the ultrasonography is generally the first option in approaching a patient who suffered an anterior cervical trauma but CT scan is able to better characterize the details that cannot be captured in the ultrasound window, as well as to check for the compressive effect on the trachea and for potential posterior cervical damage [15, 16]. In our patient the real dimensions of the goiter were accurately identified only by CT.

Similarly, abdominal ultrasonography is currently the first option when investigating potential traumatic consequences; in our case no pathological findings were described except for the cystic adrenal appearance, possibly in relation to small posttraumatic hemorrhage [17]. However, the abdominal CT did not confirm the presence of liquid components and was concordant with the final pathological examination.

Again, the traumatism suffered by our patient only led to the incidental discovery of a large, previously unsuspected, non-functional adrenal mass, with surgical indication due to the increased volume and increased serum concentrations of chromogranin A and neuron specific enolase (see Table 1). During the initial hormonal evaluation for the adrenal mass, a low-normal value of ACTH was noticed, with normal cortisol levels. The clinical evolution postadrenalectomy confirmed that ACTH suppression had been reactive, possible triggered by the stress-related elevated plasma cortisol via feedback inhibition [18].

The complex investigation of this case finally excluded the hypothesis of posttraumatic hemorrhagic nodular areas within both the thyroid and the adrenal and pointed toward the incidental discovery of both lesions during the protocol of posttraumatic investigations in a patient with a recent, moderately severe assault-related traumatism to the neck and abdominal area.

CONCLUSION

Blunt traumatic injury can be associated with traumatic hemorrhage in many organs, including endocrine glands (thyroid and adrenals); however, traumatic assault usually triggers complex investigations which can equally contribute to the diagnosis of otherwise asymptomatic tumoral endocrine pathology. Additionally, the traumatic stress can be associated with the aggravation of some preexisting medical conditions (e.g. diabetes mellitus). In order to best discern the potential traumatic effects and their respective forensic consequences, extensive investigations under specialized care are necessary.
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Conflict of interest. All the authors agree with the content of the paper.

References