tion with the tumor endocrine profile is confirmed (10,12).

Glucocorticoid osteoporosis

Despite the fact that typical Cushing's syndrome is not found, chronic cortisol exposure affects the bone and glucocorticoid osteoporosis is the most common form of secondary type (13,14,15). The source of cortisol may be endogenous as adrenal and pituitary tumour derived or exogenous since glucocorticoids are used in many rheumatologic, dermatological, lung, etc conditions (13,14,15). Regardless the origin of the glucocorticoids excess, the mechanisms of bone loss includes reduced bone formation and increased bone resorption which is time-dependent as well as dose-dependent (16,17,18). DXA (Dual-Energy X-Ray Absorptiometry) is a useful tool to evaluate the bone loss but sometimes it underestimates the fracture risk (16).

Bone status (BS)

BS is affected in adrenal incidentaloma mainly through persistent autonomous cortisol production which is called (even lately the term is not encouraged) "subclinical Cushing's syndrome" with a prevalence of 0.2 up to 2% in unselected series of adult people (19). One study published in 2018 by Kim BJ et al. showed that TBS (Trabecular Bone Score) in both men and women is negatively correlated with plasma cortisol after the use of 1 mg dexamethasone suppression test (20). Moreover, there is 2.2% decrease of TBS if subclinical Cushing's syndrome is confirmed opposite to clear non-functioning pattern of the adrenal incidenaloma (20). TBS have a tendency to correlate with the values of plasma cortisol after mentioned suppression test (20). The statistical quality of the data is higher in women (20).

Another study on 152 subjects with adrenal incidentaloma (2/3 had unilateral lesions and 1/3 had bilateral lesions) showed that among them 20% had subclinical Cushing's syndrome (more frequent in bilateral tumours) but the bone mineral density based on DXA at central sites (lumbar spine and femoral neck) was similar between the subgroups (21). Another meta-analysis based on 6 studies including 1239 patients with adrenal incidentaloma showed that metabolic complications as well as osteoporosis do not differ if the incidentaloma is uni or bilateral (22). On the other hand, the presence of subliclinical hypercortisolism is positively correlated with a higher risk of osteoporosis and fragility fractures versus patients with negative secretor profile and adrenal incidentaloma (23). Recently the term of "high risk" patients with adrenal incidentaloma has been introduced in order to describe the subgroup with autonomous cortisol secretion that has an increased risk of cardiovascular morbidities, infections and fractures (even independently of DXA - bone mineral density (24).

DISCUSSION

The influence of BS in adrenal incidentaloma is also directly due to the presence of obesity, type 2 diabetes mellitus and hyperlipemia as potential contributors to increased risk of vertebral fractures, not necessarily through hypercortisolism (25,26). Also, the data regarding the non-cortisol hormones of the adrenal cortex is controversial. The lesions like lipomas and cysts are irrelevant to BS (27). The effect of aldosterone excces over BS is less understood up to present time (3). It seems that clear aldosteron overproduction causes a deterioration of bone microarchitecture as shown by low TBS (28). Some authors suggested that a higher activity of the sympathetic activity induces skeleton status damage (29). Other secondary causes of osteoporosis related to concomitant endocrine tumours with overproduction of different hormones like pituitary adenomas including prolactionomas are described in addition to adrenal incidentalomas but this is a rare event (30,31).

The main contributor to BS, as well as to the cardiometabolic damage, remains however the autonomous cortisol secretion in adrenal incidentaloma with a potential improvement after adrenalectomy and without a specific anti-osteoporotic medication in this particular situation (32,33).

CONCLUSION

Adrenal incidentaloma and osteoporosis, respective fragility fractures are still an open topic; up to this moment the correlation is based on autonomous cortisol secretion as main contributor.

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