

Adrenal surgery amid COVID-19 pandemic

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ABSTRACT

COVID-19 pandemic affected every aspect of medical life, including the field of adrenal glands (AG). Our purpose is to overview the literature concerning AG domain, especially adrenal surgery amid COVID-19 pandemic. The approach of adrenal tumors (AT) is reflected by two aspects: what happens to a patient known with an adrenal mass if COVID-19 infection is positive and the other is related to restrictions amid pandemic daily practice that involve AT surgery. Patients with AT underlying active hormonal over-production are at higher risk of COVID-19 infection or at increased risk of developing a more severe form of coronavirus infection, for instance, via diabetes mellitus, high blood pressure, and obesity. During the first year of pandemic, especially if considering the periods with severe restrictions and lockdown, there was a massive reduction of adrenalectomies, when compare to the same months of the previous year. Several systems of deciding the timing of intervention were used; they are still an insufficient statistical validation of these scores until now. The reduction of surgery volume was less expressive during the second year of pandemic. The rate of peri-operative infections is relatively low, but it depends on center. Post-operative adrenal insufficiency exposes the patient to a higher risk of infections, including coronavirus infection. Peri-operative management can be handle via telemedicine in most of cases

Keywords: adrenal, adrenal tumor, adrenalectomy, virus, vaccine, inflammation, COVID-19, coronavirus, cortisol, glucocorticoid

INTRODUCTION

COVID-19 pandemic affected every aspect of medical life, including the field of endocrinology, respective adrenal glands (1,2,3). These aspects are related to normal glands or to pathological adrenal conditions, for instance, patients with adrenal tumors and, on the other hand, there is a massive exposure to glucocorticoids therapy in infected patients with direct inhibition of endogenous cortisol production (4-14). Also, coronavirus targets steroidogenesis at different levels, thus impairing the androgens and cortisol production, so hormonal anomalies in COVID-19 positive patients are expected, especially in severe forms (15,16).

AIM

Our purpose is to overview the literature concerning adrenal field and adrenal surgery amid COVID-19 pandemic.

METHOD

This is a brief update of literature; the articles are mostly published between 2020 and 2021 during coronavirus pandemic.

ADRENAL TUMORS

The virus is found in endocrine glands (as also seen in thyroid and pituitary gland); an acute COV-

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ID-19 infection is associated with the fact that adrenal system is heavily affected in subjects with prolonged hospitalization, while after an acute phase there is a risk of an adrenal insufficiency which requires long term follow-up (17). The approach of adrenal tumors domain is reflected by two aspects: what happens to a patient known with an adrenal mass if COVID-19 infection is positive and the other is related to adrenal surgery practice amid pandemic in terms of pre-operative presentation, surgical technique itself as well as post-operative follow-up (short and long term) (18) (Figure 1).

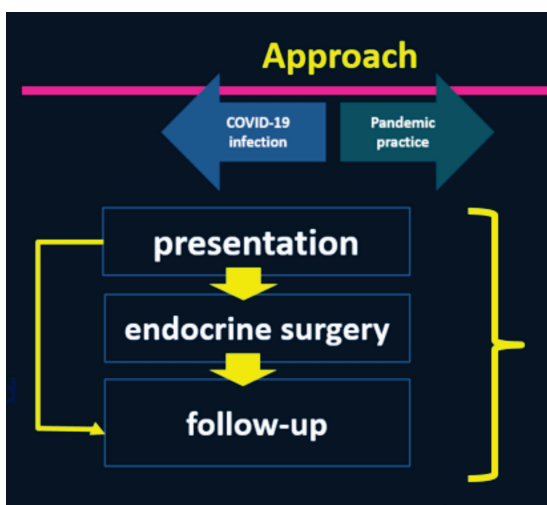


FIGURE 1. Approach of adrenal tumors and adrenal surgery amid COVID-19 pandemic

Patients known with adrenal tumors associating active hormonal over-production are at higher risk of COVID-19 infection or at increased risk of developing a more severe form of coronavirus infection, for instance, *via* diabetes mellitus, high blood pressure, and obesity (19,20,21). Cushing syndrome (including adrenocortical carcinoma) displays a higher risk of cardio-metabolic complications, as well as primary hyperaldosteronism or pheochromocytoma (22,23,24) (Figure 2).

| | obesity | HBP | DM | others |
|----------------------------|------------------------------------|--------|--------|--|
| Cushing syndrome * | 95% | 75-80% | 70% | Low potassium Coagulation anomalies Metabolic bone disease infections |
| Conn syndrome | Δ | 98% | 25% | Low potassium |
| Pheochromocytoma | Δ | 90% | 20-50% | Arrhythmia |
| * Adrenocortical carcinoma | 50-80% hormonal production | | | |
| Adrenal incidentaloma | 30% autonomous cortisol production | | | |

FIGURE 2. Cardio-metabolic elements of adrenal tumors that represent aggravating circumstances for a potential COVID-19 infection (HBP = high blood pressure; DM = diabetes mellitus)

ADRENALECTOMY

During the first year of pandemic, especially during periods with severe restrictions and lockdown, there was a massive reduction of adrenalectomies, when compare to the same months of the previous year, this aspect being regarded as a “possible ticking bomb” (25). Several systems of deciding the intervention were used; they is still an insufficient statistical validation of these scores until now (26). The reduction of surgery volume was less expressive during the second year of pandemic, so called “the new normal” (27). The rate of peri-operative infections is relatively low, but it depends on center; also post-operative adrenal insufficiency exposes the patient to a higher risk of infections, including coronavirus infection (28).

PERI-OPERATIVE USE OF TELEHEALTH

The patients that are going to be referred to adrenalectomy may be assessed through telemedicine especially concerning the check-up of blood pressure and pulse; also two weeks before surgery is recommended self-isolation at home (29,30). Moreover, the introduction of alpha and beta adrenergic blockers in cases with a favorable hemodynamic profile (that do not require hospitalization) despite the presence of pheochromocytoma has been managed via telehealth before tumor removal (31,32). In cases with post-operative adrenal insufficiency, if the patient becomes COVID-19 positive, the “sick days” rule should be followed (cases with COVID-19-induced adrenal insufficiency has also been reported) (33).

DISCUSSIONS

Other particular circumstances involving adrenal glands include the COVID-19 - related adrenal hemorrhage/infarction which typically does not require surgery, but prompt glucocorticoid replacement in cases with adrenal insufficiency (34-40). Adrenal involvement has been found in patients experiencing post-COVID long term complications as Long COVID syndrome or chronic fatigue syndrome that may aggravate a prior pathological status of adrenal glands (41-49). Interestingly, vaccination against COVID-19 has been reported as trigger of pheochromocytoma (50).

CONCLUSIONS

Adrenal glands are situated on the core of human body fighting against coronavirus infection. Patients with adrenal tumors are part from a more fragile population concerning COVID-19. After the reduction of adrenalectomy volume during the first

year of pandemic, a recovery of procedures number was experienced during the second year, mostly depending of center. Telemedicine may handle peri-operative aspects unless they are severe and

requires hospitalization. Post-operative adrenal insufficiency exposes the patient to a higher infectious risk.

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