

Case report

Retroperitoneal paraganglioma in a young patient presenting with hypertensive crisis and transient loss of sight; a rare case report and literature review

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ARTICLE INFO

Keywords:

Paraganglioma
Retroperitoneal tumor
Hypertension
Pheochromocytoma
Case report

ABSTRACT

Introduction: Catecholamine secreting tumors are a rare type of neuroendocrine tumors whose embryological origin is neural crest cells. 80 % to 90 % arise from the chromaffin cells of adrenal medulla while 10 % to 20 % arise from sympathetic and parasympathetic ganglia. Paragangliomas can be symptomatic due to excess catecholamine secretion or can be asymptomatic. Definitive treatment of paragangliomas is surgical resection.

Case: A 16 yr old male who presented with right iliac fossa pain and hypertension associated with headache and transient loss of sight. Contrast CT scan of the abdomen revealed a para-aortic retroperitoneal mass, 24 h urine Normetanephrines were significantly elevated. Pre-operative patient preparation included administration of alpha blockers then later beta blockers with adequate hydration. Intra operative blood pressure elevation during tumor manipulation managed with intravenous beta blockers. Post operatively patient required no inotropic support or anti hypertensives. Histopathology revealed features suggestive of a paraganglioma and immunohistochemistry s100 (+) Chromogranin A (+).

Discussion: Functional paragangliomas are manifested by symptoms that result from catecholamine hypersecretion. Biochemical confirmation and functional localization of the tumors is recommended. Definitive management is surgical resection with a pre requisite of adequate patient preparation which includes blood pressure control and volume replacement.

Conclusion: Tumor localisation and adequate patient preparation with alpha blockers and adequate hydration is an important prerequisite to surgical resection.

1. Introduction

Catecholamine secreting tumors are a rare type of neuroendocrine tumors whose embryological origin is neurocrest cells [1,4]. Most of these tumors are malignant and clinical presentation depends on the organs involved [2]. 80 %–90 % of these tumors arise from the chromaffin cells of the adrenal medulla and are referred to as pheochromocytomas while 10 %–20 % are extra adrenal arising from the cells of the sympathetic and parasympathetic ganglia carotid and aortic bodies and the organs of Zuckerkandl, they are referred to as paragangliomas [3,5]. 75 % of paragangliomas arise from the organs of Zuckerkandl [5]. The

incidence of pheochromocytoma and paraganglioma is estimated 0.2–1/100,000 [5]. Paragangliomas can be symptomatic due to effects of excess catecholamine secretion or they can be asymptomatic. Clinical presentation includes hypertension, anxiety, palpitations, sweating and headache [7]. The definitive treatment of paragangliomas is surgical resection [6,8]. This is a case report of a patient who was managed at an academic hospital and the report is compliant with the SCARE guidelines 2020 [9].

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<https://doi.org/10.1016/j.ijscr.2022.107781>

Received 17 September 2022; Accepted 15 November 2022

Available online 17 November 2022

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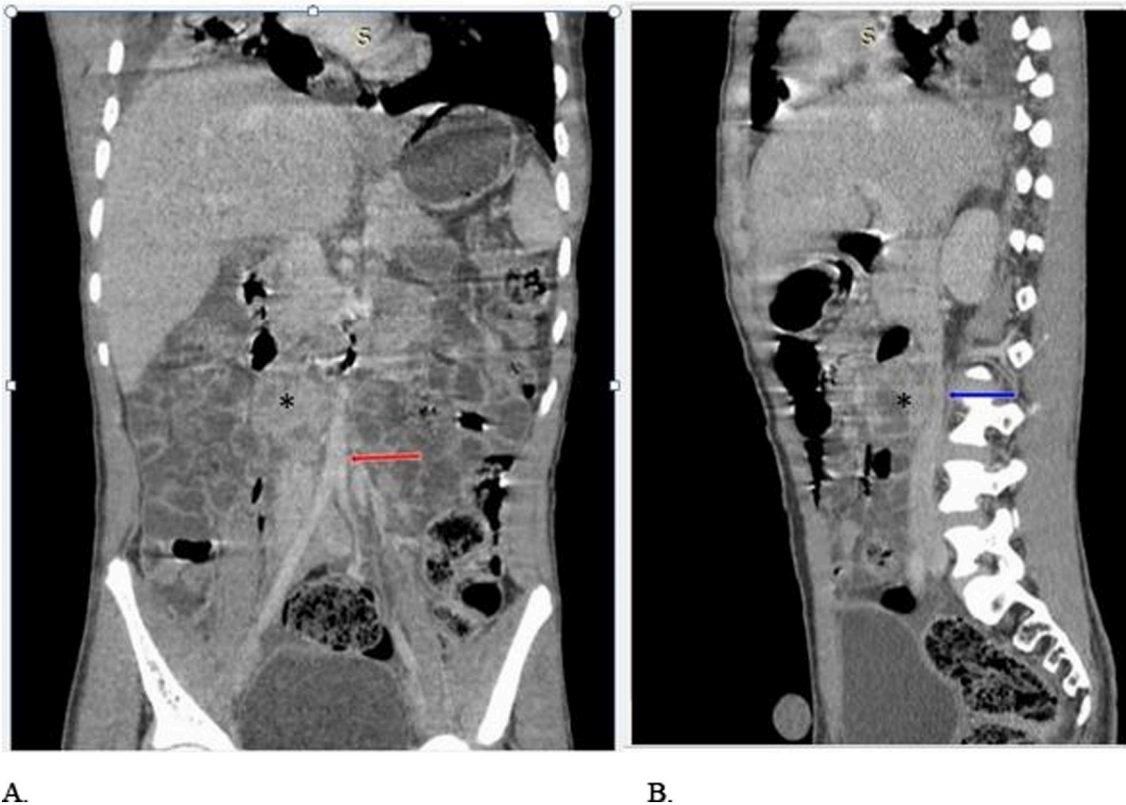


Image 1. A. coronal view CT abdomen (*tumoral mass) (red arrow: Aorta). B. Sagittal view CT abdomen (*tumoral mass) (blue arrow: inferior vena cava). (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

2. Presentation of case

A 16 yrs old male presented with a history of epigastric abdominal discomfort radiating to the right flank for 1 month and became worse 5 days before presenting to the emergency department the pain was dull and continuous with no known relieving or aggravating factors. He had a headache associated with transient loss of sight. The patient was previously well with no history of surgery and no other significant past medical history.

On examination patient was noted to have a raised blood pressure 245/152 with a pulse of 91b/min. on abdominal examination patient had a tender right flank extending to the right lower quadrant with no peritoneal irritation. There were no obviously palpable abdominal masses. On fundoscopy patient had grade 1 papilledema. Anti-hypertensives were administered for immediate blood pressure control, on further evaluation patient did not have any other features of end organ dysfunction secondary to hypertension.

2.1. Laboratory work up

Hb 10.1 g/dl, WCC $8.3 \times 10^9/l$, Platelet $521 \times 10^3/mm^3$, Urea 2.17 mmol/l, Creatinine 56.9 μ mol/l, Na 143 mmol/l K 4.49 mmol/l, 24 h urine metanephrines 1148 nmol/day (167–938), 24 h urine Normetanephrines were markedly elevated 15,968 nmol/day (311–1562).

2.2. Radiologic workup

Contrasted CT scan of the abdomen revealed a right hemi abdominal para-aortic mass identified superior to the aortic bifurcation at the level L3 abutting and compressing the inferior vena cava posteriorly. The adrenal glands were normal with no focal lesions (Image 1).

The lesion had heterogenous enhancement with areas of necrosis and cystic changes size 3.3 cm \times 3.4 cm \times 4.5 cm (AP, TRV, CC). Some

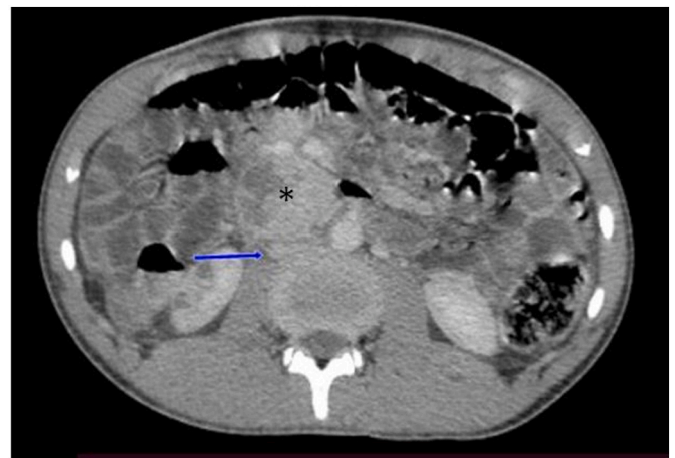
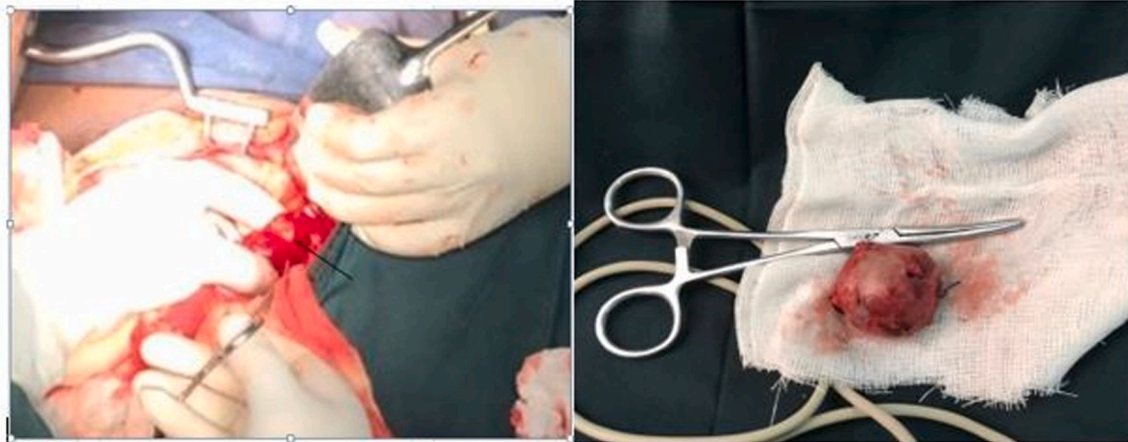


Image 2. Axial view CT abdomen (*tumoral mass) (blue arrow: inferior vena cava). (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

enhancement was noted on arterial and Porto venous imaging. The lesion measured 54HU (max density) of enhancement on arterial phase, 136 HU (max density) of enhancement in Porto venous phase and 106 HU (max density) of enhancement on the delayed phase (Image 2). The differential diagnosis was extra adrenal phaeochromocytoma in the setting of secondary hypertension in a young patient and conglomerate lymph node masses.

There was no appreciable vascular communication with the great vessels to suggest an aneurysmal lesion. The delayed phase demonstrated no communication with the right ureter to suggest an atypical urinoma.

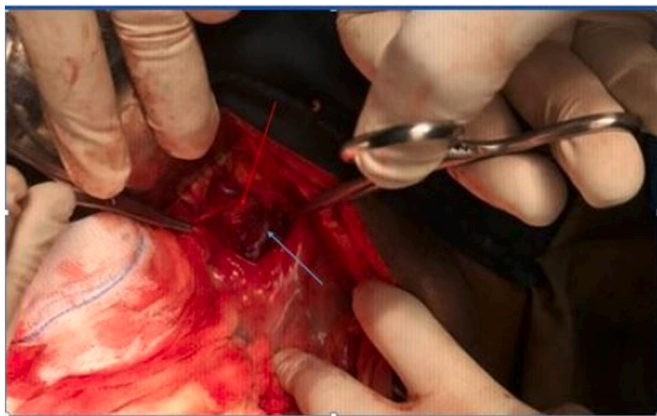


A.

B.

Image 3. A. black arrow: tumor before resection. B. Tumor after resection.

A.



B.

Image 4. A. After tumor resection (red arrow: abdominal aorta) (blue arrow: inferior vena cava). B. After repair of retroperitoneal opening (black arrow). (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

2.3. Treatment

Initial Blood pressure control, labetalol continuous infusion titrated towards achieving a normal blood pressure was given and oral antihypertensives started (enalapril 10 mg twice daily and amlodipine 10 mg once daily). Upon achieving adequate blood pressure control enalapril and amlodipine were stopped and patient was started on an alpha blocker.

Preoperatively patient was started on an alpha blocker prazosin 2.5 mg once daily for a duration of 5 weeks prior to the surgery, the blood pressure was well controlled on this regimen. A non-selective beta blocker propranolol 10 mg 8hrly was started 5 days before the day of surgery.

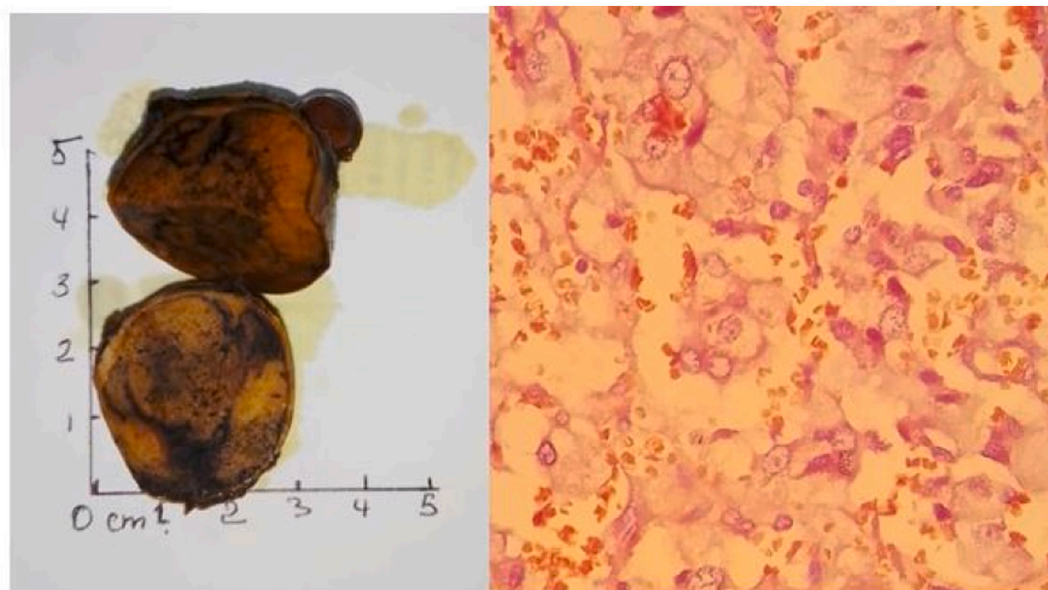
The laparotomy was performed by the attending surgeon assisted by a senior specialist general surgeon and a surgical resident. Surgery was under general anaesthesia, surgical approach was via a midline laparotomy and the findings were a bulging retroperitoneal mass superior to the aortic bifurcation, the retroperitoneum was opened just over the tumor and Parietal peritoneum covering the tumor was dissected off. The tumor was then dissected off the anterior wall of the Inferior vena cava maintaining macroscopically clear margins, the tumor was well circumscribed and measured 3 cm × 4 cm (Image 3). All intra-abdominal organs were normal with no features suggestive of metastasis.

Intra operative tumor manipulation led to fluctuations in the patient's blood pressure, with the highest recorded, 171/112 mmHg and a pulse of 124b/min and the pre operative blood pressure was 101/62 mmHg and a pulse of 63b/min. The patient was given labetalol 10 mg iv. After tumor excision, the retroperitoneum was closed and the tissue was sent for histopathology (Image 4). The duration of the surgery was 87 min and estimated blood loss was 100mls.

Post operatively the patient's blood pressure was 109/82 mmHg and pulse 82b/min, Patient was admitted to ICU and did not require inotropic support or antihypertensives. Patient spent 2 days in ICU and the patient was discharged home on day 6 post surgery. Outpatient follow up on Day 14 post surgery, Patient was well and blood pressure was 104/57 mmHg and pulse 96 m/min. At 5 weeks post-surgery BP: 120/62 HR: 66 b/min planned follow up for the patient is annual measurement of catecholamines for life.

2.4. Pathology and histochemical report

Macroscopically 35 mm × 35 mm × 25 mm solid well capsulated orange-yellow in colour. Microscopically the sections had shown a well



A.

B.

Image 5. A. Gross pathology specimen. B. Microscopic pathology image H&E stain at magnification $\times 400$.

capsulated tumor consisting of closely packed large cells arranged around the stromal blood vessels. The tumor cells had abundant granular cytoplasm and a large round nucleus with visible nucleoli. Foci of hemorrhage was also present. The capsule of the tumor was fibrous in nature with some areas of hemorrhage (Image 5). The features were those of a paraganglioma. Immunohistochemistry S 100 positive (sustentacular cells positively demonstrated, variable intensity and distribution) and Chromogranin A positive (diffuse expression) confirming the diagnosis of paraganglioma.

3. Discussion

According to the 2017 WHO classification PPGLs (pheochromocytomas and paragangliomas) are divided into tumors that originate from the adrenal medulla (pheochromocytomas) and those that arise from extra adrenal paraganglia of the autonomic nervous system (paraganglioma) [2]. Paragangliomas are further divided according to their site and hormonal secretion into i) head and neck parasympathetic paragangliomas which don't secrete catecholamines and ii) paravertebral sympathetic paragangliomas of the thorax, abdomen and pelvis (85 % are below the diaphragm) which secrete mainly norepinephrine [5,6,11]. Paragangliomas are further classified as functioning and non-functioning tumors. Functioning paragangliomas are manifested by the classic Menards triad: Cephalgia, Tachycardia and diaphoresis [1,2,4,6,8,11,13,16]. In our case symptoms were a result of catecholamine hypersecretion which included severe headache and transient loss of sight (complication of severe hypertension).

Paragangliomas may have similar radiological features on CT scan with other retroperitoneal soft tissue tumors therefore a biochemical evaluation is required [5] fractionated plasma metanephrines is the test of choice with a sensitivity of 97 %. 24 h Urine metanephrines test has the sensitivity of 90 % [5]. In our case 24 h urine metanephrines were done and revealed an elevated level of norepinephrine rather than epinephrine which is expected in an extra adrenal catecholamine secreting tumor because they lack the enzyme Phenylethanolamine N-methyl transferase (PNMT) [5-7,16].

Once biochemical diagnosis is confirmed localization of the tumor with functional imaging such as ^{123}I -metaiodobenzyl guanidine (MIBG) scintigraphy is recommended (unavailable at our institute) [5,6,8,12,15]. Fine needle aspiration cytology must be avoided due to

risk of simulating a hypertensive crisis [5].

Definitive management of paragangliomas is surgical resection [6,7,14]. Either open or laparoscopic [1,2,6]. In our case open approach was preferred because of contact and compression of the inferior vena cava. Adequate patient preparation reduces *peri* operative morbidity and mortality whose mainstay is includes control of hypertension and vascular expansion [2,10]. Optimisation encompasses blocking alpha 1 mediated vasoconstriction for 10-15 days before blocking beta 1 mediated tachycardia and adequate volume replacement (salt and fluid intake) [5,6,10]. Intra operative hypertension that occurs due to tumor manipulation is managed with short acting beta receptor antagonists as was with our case [10]. Post-operative management requires an intensive care or high dependency unit admission. Volume replacement and inotropic support is required to counteract the hypotension [10]. Post resection annual follow up biochemical testing is recommended [3].

On histopathology paraganglioma consists of polygonal chromaffin tumor cells with sustentacular tumor cells around and tumor cells are separated by abundant capillary network arranged nest like (Zellballen architecture) [6,16]. Immunohistochemistry confirms the pathological diagnosis. Chromogranin A helps distinguish paragangliomas from other neuroendocrine tumors. Paragangliomas are usually positive for synaptophysin which is less specific than chromogranin A [6] s100 stains the sustentacular cells [6,16]. In our case both chromogranin A and s100 were positive confirming the diagnosis of a paraganglioma.

4. Conclusion

Localization of catecholamine secreting tumors using functional imaging such as MIBG (^{123}I meta-iodobenzylguanidine) scan is essential in order to plan for adequate resection in the event that there are multiple tumors. Adequate patient preparation by controlling blood pressure with alpha blockers followed by beta blockers with hydration is important in preventing hypertensive crisis during intra operative tumor manipulation and postoperative hypotensive episodes. Management of paragangliomas must be multidisciplinary including the surgeons, anaesthetists and the intensivist.

Consent

Written informed consent was obtained from the patient for

publication of this case report and accompanying images. A copy of the written consent is available for review by the editor in chief of this journal on request.

Sources of funding

Support and funding for the case report was from Ndola teaching hospital and the Copperbelt university school of medicine research grant.

Ethical approval

The case study was exempted from ethical approval and written informed consent was obtained from the patient for publication of the case report and accompanying images.

Author contribution

Kasonde Mulenga: Original draft writing and preparation.
 Seke Manase Ephraim Kazuma: writing reviewing and editing.
 Chitani Mbewe: Radiology reporting, image review and editing.
 Petrenko Volodymyr: Pathology reporting, image review and editing.
 James Nonde: review and editing.
 Joseph Musowoya: Supervision.

Registration of research studies

None.

Guarantor

Kasonde Mulenga.
 Seke Manase Ephraim Kazuma.

Declaration of competing interest

Authors do not declare any conflicts of interest.

References

- [1] C.E. Rey Chaves, D. Ayala, G. García, D. Conde Monroy, J.C. Sabogal Olarte, Retroperitoneal pheochromocytoma: unusual presentation and atypical location, *Int. J. Surg. Case Rep.* 85 (2021), <https://doi.org/10.1016/j.ijscr.2021.106248>.
- [2] B. Traub, B. Haggemüller, L. Baumann, J. Lemke, D. Henne-Bruns, M. Wittau, Unclear retroperitoneal tumors, an interdisciplinary challenge – a case report and review of the literature, *Int. J. Surg. Case Rep.* 89 (2021), <https://doi.org/10.1016/j.ijscr.2021.106634>.
- [3] E.M. Mannina, Z. Xiong, R. Self, E. Kandil, Resection of a catecholamine-elaborating retroperitoneal paraganglioma invading the inferior vena cava, *Case Rep. Surg.* 2014 (2014) 1–4, <https://doi.org/10.1155/2014/837054>.
- [4] N. Houari, S. Touzani, H. Salhi, M.-Y. Alaoui Lamrani, K. Ibmajdoub, H. el Ouahabi, A. el Bouazzaoui, B. Boukatta, M. Maâroufi, K. Maazaz, N. Kanjaa, Retroperitoneal paraganglioma-induced cardiogenic shock rescued by preoperative arterial embolization, *Case Rep. Crit. Care* 2018 (2018) 1–5, <https://doi.org/10.1155/2018/4058046>.
- [5] S. Mahmoud, M. Salami, H. Salman, A rare serious case of retroperitoneal paraganglioma misdiagnosed as duodenal gastrointestinal stromal tumor: a case report, *BMC Surg.* 20 (1) (2020), <https://doi.org/10.1186/s12893-020-00712-z>.
- [6] Y. Yang, G. Wang, H. Lu, Y. Liu, S. Ning, F. Luo, Haemorrhagic retroperitoneal paraganglioma initially manifesting as acute abdomen: a rare case report and literature review, *BMC Surg.* 20 (1) (2020), <https://doi.org/10.1186/s12893-020-00953-y>.
- [7] P. Li, A rare case of retroperitoneal paraganglioma - case report and literature review, *Transl. Gastroenterol. Hepatol.* 2016 (JULY) (2016), <https://doi.org/10.21037/tgh.2016.06.01>.
- [8] X. Xue, D. Wang, Y. Xiao, Z. Ji, Y. Xie, Functional paraganglioma with tumor thrombus in the inferior vena cava, first case report, *Transl. Androl. Urol.* 10 (4) (2021), <https://doi.org/10.21037/tau-21-50>.
- [9] R.A. Agha, A.J. Fowler, A. Saeta, I. Barai, S. Rajmohan, D.P. Orgill, R. Afifi, R. Al-Ahmadi, J. Albrecht, A. Alsawadi, J. Aronson, M. Hammad Ather, M. Bashashati, S. Basu, P. Bradley, M. Chalkoo, B. Challacombe, T. Cross, L. Derbyshire, D. Rosin, The SCARE statement: consensus-based surgical case report guidelines, *Int. J. Surg.* 34 (2016) 180–186, <https://doi.org/10.1016/j.ijssu.2016.08.014>.
- [10] R. Ramachandran, V. Rewari, Current perioperative management of pheochromocytomas, in: *Indian Journal of Urology* Vol. 33, Medknow Publications, 2017, pp. 19–25, <https://doi.org/10.4103/0970-1591.194781>. Issue 1.
- [11] C.C. Yang, A case report of retroperitoneal mass: paraganglioma, *J. Int. Med.* Taiwan 29 (3) (2018) 169–174, [https://doi.org/10.6314/JIMT.201806_29\(3\).07](https://doi.org/10.6314/JIMT.201806_29(3).07).
- [12] W.C. Lin, H.Y. Wang, C.W. Chang, J.L. Lin, C.H. Tsai, Retroperitoneal paraganglioma manifesting as paralytic ileus: a case report, *J. Med. Case Rep.* 6 (2012), <https://doi.org/10.1186/1752-1947-6-158>.
- [13] S.S. Kadam, S. Hegde, A. Galage, T. Kadam, Functional malignant retroperitoneal paraganglioma with liver metastasis: a rare case report, *Indian J. Surg. Oncol.* 12 (2021) 186–192, <https://doi.org/10.1007/s13193-020-01259-4>.
- [14] A.-S. Dhafer Mohamed, Q. Fawaz Ali Ahmed, Retroperitoneal paraganglioma in the extra-adrenal gland: a case study report, Aseer Central Hospital, Saudi Arabia, *Int. J. Surg. Res. Pract.* 8 (4) (2021), <https://doi.org/10.23937/2378-3397/1410133>.
- [15] Q. Guo, B. Li, J. Guan, H. Yang, Y. Wu, Intraoperative diagnosis of functional retroperitoneal multiple paraganglioma: a case report, *Oncol. Lett.* 4 (4) (2012) 829–831, <https://doi.org/10.3892/ol.2012.795>.
- [16] S. Akhtar, S. Sattar, E. Bari, N. Kayani, S. Moeen, Secretary paraspinal paraganglioma of thoracolumbar spine: case report and review of literature, in: *Surgical Neurology International* Vol. 7, Medknow Publications, 2016, pp. S889–S892, <https://doi.org/10.4103/2152-7806.194510>. Issue 38.