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Anaesthetic Management of Giant Phaeochromocytoma on a Patient With Chronic Renal Disease

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Abstract

**Background**: Phaeochromocytoma is a rare catecholamine secreting tumour characterized by increase in systemic vascular resistance and blood pressure. It account for 0.1% of hypertension in the general population. Early diagnosis and definitive treatment with surgical excision is generally advocated as complications of undiagnosed phaeochromocytoma may be fatal, especially in patients undergoing surgery for other disorders or in pregnant women during delivery. The diagnosis of phaeochromocytoma often requires detailed preparations because of the challenges its excision poses to the anaesthetist, the surgeons and other members of the management team especially where the incidence is low and experience in the management suboptimal.

**Results**: This report illustrates the perioperative management of a 29 year old female who presented with severe hypertension complicated by chronic kidney disease and a huge left adrenal mass confirmed to be phaeochromocytoma. After preoperative optimization, the left adrenal tumour weighing 1,350g was successfully excised under general anaesthesia. Severe hypertensive crisis during surgery was successfully controlled with a combination of phentolamine, glycerine trinitrate and magnesium sulphate, while hypotension following removal of the tumour was managed with graded dosages of dopamine. Postoperative recovery was uneventful and she was discharged home in satisfactory condition seven days after surgery.

**Conclusion**: Perioperative management of patients with phaeochromocytoma though challenging, can be successfully undertaken with adequate preoperative optimization, use of appropriate drugs and adequate perioperative monitoring.

**Key words**: Anaesthesia, Phaeochromocytoma, Chronic renal disease, Catecholamine surge, Hypertensive crisis.

Résumé

**Contexte**: Phéochromocytome est une tumeur secrétant des catécholamines rare caractérisée par l'augmentation de la résistance vasculaire systémique et la pression artérielle. Elle représente 0,1% de l'hypertension dans la population générale. Un diagnostic précoce et le traitement définitif par l'exérèse chirurgicale est généralement préconisé
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Introduction

Phaeochromocytoma is a rare catecholamine secreting tumour originating from the chromaffin cells of the sympathetic nervous system in the adrenal medulla and occasionally from extra-adrenal sites. The hallmark of this disease is an increase in systemic vascular resistance and blood pressure. It is a potentially curable cause of hypertension, seen in 0.1% of hypertensive population. Early diagnosis and surgical excision are generally considered as the mainstay of treatment. Despite advances in surgical techniques and anesthetic management, the perioperative management of phaeochromocytoma can still be challenging, particularly in patients with chronic renal disease. A detailed preoperative assessment is essential to reduce the risk of complications. In this report, we describe the anaesthetic management of a 29-year-old woman with severe arterial hypertension and chronic renal disease due to a giant left adrenal mass confirmed to be a phaeochromocytoma. After optimization, the left adrenal mass weighing 1.350g was excised successfully under general anaesthesia. A severe hypertensive crisis during surgery was controlled successfully with a combination of phentolamine, glyceryl trinitrate, and magnesium sulphate, while hypotension after tumour removal was managed with progressive doses of dopamine. Postoperative recovery was uneventful and she was discharged home in a satisfactory condition seven days after surgery.

Conclusion:

The perioperative care of patients with phaeochromocytoma, despite its complexity, can be successfully managed with appropriate preoperative optimization, use of appropriate medications, and adequate perioperative monitoring. Early intervention and surgical excision are generally considered as the mainstay of treatment. However, the perioperative management of phaeochromocytoma can still be challenging, particularly in patients with chronic renal disease. A detailed preoperative assessment is essential to reduce the risk of complications. In this report, we describe the anaesthetic management of a 29-year-old woman with severe arterial hypertension and chronic renal disease due to a giant left adrenal mass confirmed to be a phaeochromocytoma. After optimization, the left adrenal mass weighing 1.350g was excised successfully under general anaesthesia. A severe hypertensive crisis during surgery was controlled successfully with a combination of phentolamine, glyceryl trinitrate, and magnesium sulphate, while hypotension after tumour removal was managed with progressive doses of dopamine. Postoperative recovery was uneventful and she was discharged home in a satisfactory condition seven days after surgery.
diagnosis and surgical excision is generally advocated as complications of undiagnosed phaeochromocytoma may be fatal. The perioperative mortality rate for elective resection of phaeochromocytoma is 0-3%, while in an undiagnosed or poorly-prepared patient it may approach 80%. The diagnosis of phaeochromocytoma can be challenging particularly in poor resourced setting, leading to late diagnosis. Due to the rarity of this tumour, it may be a single case lifetime encounter by a surgeon or a physician in clinical practice. Haemodynamic instability in the perioperative period is particularly challenging. In this report, we describe the perioperative and the anaesthetic care of a female patient with a giant phaeochromocytoma and chronic kidney disease managed at our centre. It is aimed to highlight the presence of this tumour in our environment and some of the perioperative challenges and management options.

Case Report

A 29 year old female was referred to our hospital with features consistent with left phaeochromocytoma. She presented with hypertension of 6 years duration with occasional episodes of hypertensive crisis, headache, palpitation and left sided upper abdominal pain. She later developed facial and bilateral leg swelling, with associated hiccups and vomiting six months before presentation. On examination, she was alert and cooperative. The pulse rate was 86/min, respiratory rate 20/min and blood pressure of 220/130 mmHg supine. The Chest was bilaterally clear; the abdomen was full, with tenderness in the left flank. Chest X-ray showed cardiomegaly. Electrocardiography and echocardiography showed high cardiac output, concentric left ventricular hypertrophy and normal ejection fraction. Her glomerular filtration rate was reduced to
39mls/min. Abdominal CT scan as shown in Figure 1 suggested left phaeochromocytoma, further supported by elevated urinary metanephrine and normetanephrine. She was admitted, scheduled for left adrenalectomy and stabilized on oral prazocin 2mg twice daily, phenoxybenzamine 10mg daily, co-micardis 80mg daily and atenolol 100mg daily. At preoperative-anaesthetic review, her body weight was 54kg with a pulse rate of 74/minute while the BP was 130/90mmHg supine and 110/80mmHg erect. Airway findings were predictive for easy intubation. Her packed cell volume (PCV) was 26%, the serum electrolytes were normal but the urea (11.7mmol/L) and creatinine (138µmol/L) were raised. Her fasting blood sugar was 4.6mmol/l and routine preoperative fasting was observed. All the anti-hypertensives were continued up till the morning of surgery. Oral diazepam 10mg was given the night before and on the morning of surgery.

In the operation theatre, non-invasive monitoring was commenced before intravenous and arterial cannulations. After preoxygenation, the patient was induced with intravenous fentanyl 80µg, propofol 155mg, and tracheal intubation carried out with cuffed 8.0mm tube facilitated with 30mg atracurium. Intravenous lidocaine 85mg and phentolamine 5mg were administered to avert pressor response. Anaesthesia was maintained with isoflurane in oxygen/air mixture, atracurium and pentazocine. Ventilation was mechanically controlled. Right internal jugular vein was cannulated for central venous pressure (CVP) monitoring, fluid and drug administration. Glycerine Trinitrate (GTN) infusion was commenced before skin incision to facilitate haemodynamic stability. Neuromuscular function was monitored with a nerve stimulator. Operative findings confirmed left adrenal tumour fused to the distal pancreas métanéphines et normétanéphrine urinaire élevés. Elle a été admise, prévue pour la surrenalectomie gauche et stabilisé sur 2mg prazocine orale deux fois par jour, phenoxybenzamine 10mg par jour, Co-micardis 80mg par jour et l'aténolol 100mg par jour. À l'examen anesthésique préopératoire son poids était 54Kg avec un pouls de 74/minute tandis que la pression artérielle était 130/90mmHg en position couchée et 110/80mmHg debout. Les conclusions de la voie aérienne étaient prédictives d'une intubation facile. Son hémocrit était 26%, les électrolyte sériques étaient normaux, mais l'urée (11,7mmol/l) et la créatinine (138µmol/l) étaient élevées. Son taux de glycémie à jeun était 4,6mmol/l et le jeûne préopératoire de routine a été observé. Tous les antihypertenseurs ont été continués jusqu’à la matinée de la chirurgie. 10mg de diazépam oral a été donné la veille et le matin de la chirurgie.

Dans la salle d’opération, une surveillance non invasif a été commencée avant canulassions intraveineuse et artérielle. Après pré oxygénation, la patiente a été induite avec 80µg de fentanyl par la voie intraveineuse, 155mg du propofol et l’intubation trachéale réalisée avec un tube 8.0mm menottée, facilitée avec 30mg d’atracurium. 85mg de lidocaine et 5mg de phentolamine ont été administrées pour prévenir réponse pressivé. L’anesthésie a été maintenue avec l’isoflurane en mélange d’oxygène/air, l’atracurium et la pentazocine. La ventilation a été commandée mécaniquement. Veine jugulaire interne droite a été canulée pour la surveillance de pression veineuse centrale, l’administration des fluides et des médicaments. Perfusion du trinitrate de glycérol a été commencée l’incision cutanée pour faciliter la stabilité hémodynamique. Fonction neuromusculaire a été contrôlée avec un stimulateur de nerf. Constatations opératoire ont confirme une tumeur surrénale gauche fusionnée au pancréas distal et la rate mesurant 18x13x11
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and the spleen, measured 18x13x11cm and weighed 1,350g (Figure 2). There were no extra adrenal tumours and no significant lymph node enlargement. Operative manipulation of tumour resulted in hypertension and tachycardia necessitating addition of magnesium sulphate (MgSO₄) infusion until the tumour was removed. Left adrenalectomy was carried out en-bloc with partial distal pancreatectomy and splenectomy through a midline incision. After removal of the tumour, GTN and MgSO₄ were discontinued, dopamine infusion was commenced, and haemodynamic stability was achieved. The PR and invasive BP recordings were as shown in figure 3. Throughout the operation period, the RBS ranged between 4.6 and 7.2mmol/l. After surgery lasting 7hrs, neuromuscular function assessment showed full recovery; neostigmine was therefore avoided and isoflurane was discontinued. She was transferred to the Intensive care unit on dopamine infusion and extubated awake 3hrs later. Dopamine was tailed off over another 2hrs. Subsequent course of recovery was uneventful. She was discharged home 7days after surgery on oral nifedipine 20mg daily. Histopathology report confirmed phaeochromocytoma.

Discussion
Common complications of phaeochromocytoma from sympathetic overactivity and the associated uncontrolled high blood pressures include arrhythmias, heart failure, myocardial infarction, and cerebrovascular haemorrhage. Presentation with chronic kidney disease (CKD) as a result of uncontrolled hypertension due to catecholamine surge as witnessed in this patient is rare and may be due to delayed presentation and management before she eventually presented in our hospital. The delay in management probably reflects challenges with diagnosis often encountered in

Discussion
Les complications communes de pheochromocytome d'hyperactivité sympathétique et les incontrôlées pressions artérielles associées comprennent les arythmies, l'insuffisance cardiaque, infarctus du myocarde, et l'hémorragie cérébrovasculaire. Présentation d'une maladie rénale chronique en raison d'une hypertension non contrôlée dû à la surtension catécholamine comme en témoigne cette patiente est rare et peut être du à la présentation et gestion tardives avant qu'elle a finalement présenté dans notre hôpital. Le retard dans l'entretien reflète probablement des défis a un diagnostic souvent rencontres dans les pays en développement comme l'a souligné par des rapports précédente. Maladie rénale chronique peuvent considérablement
Figure 1: CT scan of the patient with huge left sided phaeochromocytoma.

Scan de la patiente avec phéochromocytome gauche.
Figure 2: GIANT LEFT PHAEOCHROMOCYTOMA MEASURING 18 X 13 X 11 CM AND WEIGHING 1350G WITH THE SPLEEN ON ITS LEFT SIDE

PHÉOCHROMOCYTOME GÉANT GAUCHE MESURANT 18 X 13 X 11 CM ET PESANT 1350G AVEC LA RATE SUR SON CÔTÉ GAUCHE
Figure 3: COMPUTER RECONSTRUCTION OF THE PATIENT'S DIRECT ARTERIAL PRESSURE AND PULSE RATE IN THE OPERATING ROOM

RECONSTRUCTION INFORMATIQUE DE LA PRESSION ARTÉRIELLE DIRECTE DE LA PATIENTE DANS LA SALE D'OPÉRATION

Key:

** Rate • Pulse

| Arterial Pressure

Incision time

Induction time

Tumour mobilization

Tumour removal

End of surgery

Time (Minutes)
developing nations as highlighted by previous reports. CKD can significantly modify the course of anaesthesia, necessitating the need for avoidance of renal dependent drugs as in this case. Huge phaeochromocytoma in excess of 1000g is rare with only a few cases reported in literature. Although, tumour size does not correlate with the symptoms severity, large tumour as in this case, coupled with prolonged duration of anaesthesia has been considered significant independent risk factors for adverse perioperative events in open surgery.

Preoperative preparation is conventionally done with α-adrenergic blockade over a period of 10-14 days and subsequently, additional β-adrenergic blockade is required to treat any associated tachyarrhythmias. Adequacy of preoperative optimization as evident by absence of in-hospital BP greater than 160/90 mmHg for 24hrs prior to surgery and orthostatic hypotension with BP less than 80/45 mmHg; ST or T wave changes for 1 week prior to surgery; and greater than 5 premature ventricular contractions per minute should be ensured. Poor preoperative preparation is a major predictor of morbidity and mortality. This informed the need for adequate preoperative stabilization of our patient before anaesthesia and surgery.

Various anaesthetic drugs and techniques have been used for this procedure and none can be termed as ideal. Availability remains a major determinant in the choice of drugs used in the perioperative management of phaeochromocytoma in Nigeria as in many other developing countries. Successful use of chlorpromazine, hydralazine, and phentolamine in intraoperative management of hypertensive crisis has been previously reported. However, prolonged sedation, hypotension and tachyarrhythmia are major drawback of these drugs. GTN was combined to modify the course of the anaesthesia, necessitating dérobade des médicaments rénale dépendante comme dans ce cas. Phéochromocytome énorme excédent de 1,000g est rare avec seulement quelques cas rapportés dans la littérature. Bien, grandeur de la tumeur n'est pas en corrélation avec la sévérité des symptômes, grande tumeur comme dans ce cas et durée prolongée d'anesthésie ont été considérée comme significative des facteurs de risque indépendants pour les événements indésirables péri opératoire en chirurgie ouverte.

Préparation préopératoire se fait classiquement avec les α-bloquants sur une période de 10 – 14 jours et par la suite, d'autre β-bloquants sont nécessaire pour traiter les tachyarythmies associés. Adéquation de l'optimisation préopératoire comme en témoigne par l'absence de pression artérielle supérieur a 160/90 mmHg 24 heures avant la chirurgie et l'hypotension orthostatique avec pression artérielle moins de 80/45 mmHg ; modification de l'onde ST ou T pour une semaine avant la chirurgie, et une plus grande de 5 contractions ventriculaire prématurées par minute devrait est être assurée. Préparation préopératoire pietre est un facteur prédictif majeur de morbidité. Cette informe le besoin le besoin de stabilisation préopératoire adéquat de notre patient avant l'anesthésie et la chirurgie.

Divers médicament anesthésiques et techniques ont été utilisées pour cette procédure et aucune ne peut être qualifier comme idéal. Disponibilité reste un déterminant majeur dans le choix des médicaments utilisées dans la gestion péri opératoire de phéochromocytome au Nigeria dans des nombreux autres pays en développement. L'utilisation réussie de la chlorpromazine, hydralazine, et phentolamine dans la gestion de crise hypertensive péri opératoire a été précédemment rapportée. Cependant, sédation prolongée, une hypotension tachyarythmie est inconvénient.
with MgSO₄ and phentolamine to achieve haemodynamic control in this case which ensured smooth intra- and immediate post-operative periods. 

Conclusion: Perioperative management of patients with phaeochromocytoma though challenging, can be successfully undertaken with adequate preoperative optimization, use of appropriate drugs and proper monitoring. 

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