CASE SERIES

RETROPERITONEAL LYMPH NODE DISSECTION: CASE SERIES AND CONTEMPORARY LITERATURE PERSPECTIVES

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Background: Retroperitoneal lymph node dissection (RPLND) is an established procedure for managing metastatic germ cell tumours, though it is infrequently performed. This study aimed to evaluate clinical outcomes and complications of RPLND conducted at Pakistan Kidney and Liver Institute & Research Center (PKLI & RC), Lahore, from August 15, 2022, to July 16, 2024. **Methods:** A retrospective case series was conducted using clinical data from five patients who underwent RPLND. Demographic details, surgical characteristics, postoperative course, and pathology reports were recorded. **Results:** The mean age of patients was 30.4±3.98 years. The average operative time was 256.0±85.47 minutes. Blood loss requiring transfusion occurred in one case. The average hospital stay was 7.2±1.48 days. Pathologies included mature cystic teratoma, teratoma, and mixed germ cell tumour. **Conclusions:** RPLND yielded favourable outcomes with manageable postoperative complications. Further studies with larger sample sizes are recommended.

Keywords: Retroperitoneal lymph node dissection; Germ cell tumour; Testicular cancer; Lymph node metastasis

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INTRODUCTION

Testicular cancer, the most common solid organ malignancy in young men aged 15–35, boasts excellent long-term cure rates due to multimodal management.[1,2] Retroperitoneal lymph node dissection (RPLND) complements this approach by enhancing survival rates[3,4], involving resection around great vessels to manage testicular tumour metastasis[5,6]. Retroperitoneal lymph node dissection serves as both staging and therapeutic surgery, often following chemotherapy.[5,6] It carries risks, notably ejaculatory dysfunction due to nerve damage, mitigated by nerve-sparing techniques.[5,6] Minimally invasive approaches have improved post-operative recovery.[7–9] Local outcomes and complications remain understudied. Given demographic and clinical differences, understanding local influences on RPLND outcomes is crucial. This study aims to assess Pakistan Kidney and Liver Institute & Research Centre (PKLI & RC) RPLND outcomes, compare them with literature, and enhance surgical care.

MATERIAL AND METHODS

The study was conducted in the Urology Department of the Pakistan Kidney and Liver Institute & Research Centre (PKLI & RC), Lahore. This setting provided a comprehensive background for assessing patients who had been through Retroperitoneal Lymph Node Dissection (RPLND) because it provided a broad access to medical records and follow-up data. The study participants were patients who had RPLND at PKLI & RC between 15th August 2022 and 16th July 2024. The study was initiated after getting the approval from the IRB with a reference number PKLI-IRB/AP/219. Informed consent was obtained from all participants included in the study. All patients, irrespective of age or gender, who underwent RPLND at PKLI & RC during the study period and consented to the use of their medical records for research were included. This study was a retrospective case series. The study gathered and evaluated data from patients who have previously undergone RPLND which enabled assessment of the post-operative results and adverse effects. Due to the nature of study, the sample included all the patients who satisfied the inclusion criteria within the given time frame, making the total sample size of 5 patients. Primary outcomes of the study were Intra and Postoperative complications which were any complications that occurred during or after RPLND including infection, bleeding and other adverse events that may have occurred after the surgery. Data were collected from the patients' records using a structured data collection form, included

variables such as: Patient's Demographic Data (Age, gender, etc.), Pathological and Tumour Profile (Type of cancer, stage, etc.), Operative Features (Surgery time, estimated blood loss, intraoperative complications, etc), Follow-up Results (Postoperative complications, length of hospital stay, etc). This standardized approach ensured that all relevant data was systematically recorded and analyzed. Data was entered into a secure database and coded to maintain confidentiality. Statistical analysis was conducted using SPSS software version 27. The analysis included descriptive statistics that summarize patient characteristics, postoperative outcomes, and complications. The results were presented as means, standard deviations, and percentages where applicable.

RESULTS

The mean age of the patients was 30.40±3.98 years, with a range of 10 years. The mean BMI was 21.64±3.93 kg/m², with a range of 8.7 kg/m². Among them, 3 (60%) participants were married, and 2 (40%) were single. Four (80%) of participants did not have children, while 1 (20%) had children. None of the participants had any known drug allergies. Primary diagnosis showed 4 (80%) of participants were diagnosed with Mixed Germ Cell Tumour. One (20%) of the participants was diagnosed with Metastatic Mixed Germ Cell Tumour. CT scan in 4 (80%) patients was used as an imaging technique while MRI was used in 1(20%) of the participants. The mean lesion size was 9.580±7.301 cm. Imaging result of a complex case of RPLND was presented in figure 1.

All surgeries were performed using the open approach. Nerve sparing was not performed in any of the cases. All cases were post-chemotherapy RPLND. General anaesthesia was used in all cases. The lymph nodes were located in the bifurcation of IVC and Aorta (20%), left lateral to Aorta below the renal vein (20%), para-aortic area (20%), and around the Aorta (40%). Some images of RPLND with left ureter passing through mass resection with ureteroureterostomy shown in figure 2.

The ASA (American Society of Anaesthesiologists) score for the patients in the study had a mean of 1.00 with no variability (±0.00), indicating that all patients were classified as ASA I, meaning they were healthy individuals with no systemic disease. Table 1 presents essential laboratory findings for both pre-operative and post-operative parameters, compared to their respective normal ranges.

One patient (20.0%) experienced an intra-operative complication. For its management patient received two units of packed red blood cells (PRBCs). Clinical and Surgical Parameters were presented in table 2.

None of the patients experienced a chyle leak, developed a hematoma or seroma, had urinary retention, experienced bowel obstruction, or had pulmonary complications. All patients met the discharge criteria and received postoperative thromboprophylaxis. In terms of pain control, 4 out of 5 (80.0%), received epidural analgesia, while 1 patient (20.0%) was managed with IV analgesics. Regarding wound infection, 4 patients (80.0%) did not experience any infection, whereas 1 patient (20.0%) had a wound infection and received antibiotics according to culture and sensitivity results. For prophylactic antibiotics, 3 patients (60.0%) were administered Piperacillin/Tazobactam, and 2 patients (40.0%) received Cefoperazone/Sulbactam. Pathology results revealed a variety of findings: 1 patient was diagnosed with Mixed Germ Cell Tumour, 1 patient had a Non-Viable Tumour, 2 patients had Teratoma, and 1 patient was found to have Mature Cystic Teratoma as shown in Figure 3.

All patients were managed with a surveillance plan on follow up. Out of the 5 patients, 1 patient (20.0%) died. The single case of mortality was attributed to disease progression (1/5, 20.0%). No missing data were observed for the included patients. All clinical, laboratory, imaging, surgical, and follow-up fields were complete in the medical records of the five enrolled cases.

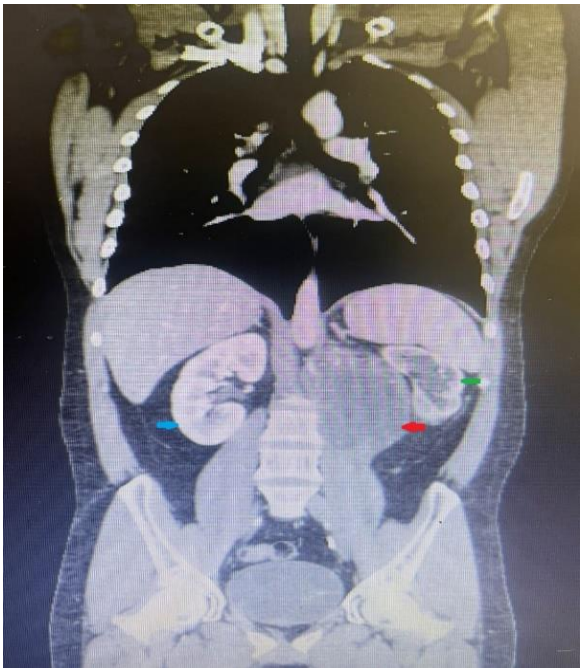

Figure-1: CT scan of Retroperitoneal mass. Blue arrow showed right kidney; Red arrow showed Retroperitoneal mass; green arrow showed left kidney.

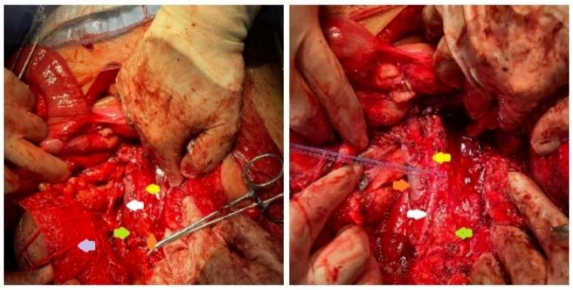

Figure-2: RPLND with left ureter passing through mass resection with ureteroureterostomy.
(A) yellow arrow: Aorta, white arrow: IVC, mauve arrow: Ureter, green arrow: Right common iliac artery, orange arrow: Left common iliac artery. (B) yellow arrow: Aorta, orange arrow: IVC, white arrow: Right common iliac artery, green arrow: Left common iliac artery

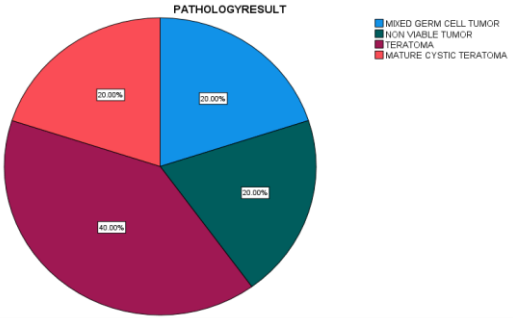

Figure-3: Pathological findings of RPLND

Table-1: Pre-and post-orchiectomy laboratory parameters in patients undergoing RPLND compared with standard reference ranges

Lab Parameter	Mean±SD	Normal Range
Haemoglobin (HB)	11.54±1.63 g/dL	13.5–17.5 g/dL (Men) 12.0–15.5 g/dL (Women)
Platelets (PLT)	302.60±78.03 x10³/µL	150–450 x10³/µL
Total Bilirubin	0.644±0.744 mg/dL	0.1–1.2 mg/dL
INR	1.068±0.194	0.8–1.2
eGFR	107.52±20.57 mL/min/1.73m²	>90 mL/min/1.73m²
Serum Creatinine	0.852±0.136 mg/dL	0.7–1.3 mg/dL (Men) 0.6–1.1 mg/dL (Women)
Pre-Orchiectomy AFP	179.32±190.21 ng/mL	<10 ng/mL
Post-Orchiectomy AFP	136.476±292.117 ng/mL	<10 ng/mL
Pre-Orchiectomy bHCG	88.620±163.081 IU/L	<5 IU/L
Post-Orchiectomy bHCG	9.060±17.233 IU/L	<5 IU/L
Pre-Orchiectomy LDH	403.40±75.66 IU/L	140–280 IU/L
Post-Orchiectomy LDH	329.200±159.024 IU/L	140–280 IU/L

Table 2: Operative and postoperative clinical outcomes of patients undergoing retroperitoneal lymph node dissection (RPLND)

Parameter	Mean±SD
Duration of Surgery (minutes)	256.00±85.46
Size of Lymph Node (cm)	8.50±5.50
Estimated Blood Loss (mL)	480.00±420.71
Histopathology Specimen Size (cm)	9.40±5.63
Duration of ICU Stay (days)	2.40±0.54
Time of Ambulation (days)	1.20±0.44
Length of Hospital Stay (days)	7.20±1.48
Urinary Catheter Duration (days)	3.40±0.89
Drain Out (days)	10.20±6.90

DISCUSSION

In comparison with existing literature, our findings align closely with several high-volume centers that have reported on post-chemotherapy retroperitoneal lymph node dissection (PC-RPLND) outcomes. For instance, Pearce *et al*. (2021) reported outcomes from a high-volume UK center, noting a Clavien 3+ complication rate of 7%, with an overall survival rate of 89% at a median follow-up of 36 months. This study underscores the significance of centralization in the provision of quality care especially in cases of complicated medical problems. We found comparable complication and survival rates to those of other studies, indicating that specialized centers can offer similar results, including in the most complex of surgical operations.[10]

In the same way, Considine *et al*. (2016) from the Ireland tertiary care center, the 5-year survival rate was 95%. Their observations of the total abdominal response in almost all patients are similar to our results, where specialized approach to surgery has resulted in good long-term prognosis in patients with PC-RPLND. This is a clear indication that the metastatic testicular cancer requires very delicate surgery across different centers.[11]

Shayegan *et al*. (2007) also stressed on the importance of surgical resection of residual masses

after chemotherapy with disease-specific survival and progression-free probability rates of 81% and 70% respectively.[12] In their study, they found the size of residual masses and the presence of teratoma as significant predictors of disease progression, which is in concordance with our study where complete surgical resection was the cornerstone to good oncological outcome.

As discussed by Ghoreifi *et al*. (2023) and Li *et al*. (2019) the use of robotic assisted techniques has also advocated the use of minimally invasive approaches in PC-RPLND. Ghoreifi *et al*. (2023) stated that the adherence rate was 16%. A 7% complication rate with no 90-day hospital readmissions give the impression that robotic PC-RPLND, if done at highly specialized centres, can be both safe and effective.[13] Li *et al*. (2019) have compared robotic with open PC-RPLND and found that robotic approach was related to less estimated blood loss and shorter hospital stay but did not influence the oncologic outcomes. Coupled with our data, these observations highlight the evolution of robotic surgery from a tool to enhance oncologic outcomes to a means of enhancing patient recovery [14]. Several local studies have highlighted the role and outcomes of post-chemotherapy retroperitoneal lymph node dissection (PC-RPLND) in testicular cancer management. Tunio *et al*. reported favourable long-term outcomes over a 15-year period, with RPLND contributing to improved prognosis in poor-risk non-seminomatous germ cell tumour (NSGCT) patients.[15] Nauman *et al*. demonstrated acceptable survival rates and histological findings supporting the safe conduct of complex RPLNDs in high-volume centers.[16] In contrast, Murtaza *et al*. observed a low frequency of RPLNDs, suggesting gaps in early diagnosis and timely referral.[17]

Our results clearly align with available literature, underscoring the importance of appropriate patient selection and the potential benefits of minimally invasive procedures (MIP) in PC-RPLND. The strengths of this study include its execution in a high-volume center. However, limitations such as a short follow-up period, retrospective design, and small sample size must be acknowledged. Larger, prospective multicenter studies with longer follow-up are needed to validate and generalize these outcomes.

CONCLUSION

Thus, this study is a step forward in the series to explore the place of RPLND in the management of urological cancers in Pakistan. In so doing, our study seeks to add to existing knowledge about RPLND and offer a basis for further research and development of clinical practice at PKLI & RC and other centre. The conclusions of this study will have significant implications for the surgical management of testicular cancer and other urological malignancies in the present region and in the international community.

Conflicts of interest: None to declare.
Acknowledgments: None to declare.

AUTHORS' CONTRIBUTION

NBN, AUR, SM, NZ, HA, YK: Study concept and design. NBN, YK, AUR, SM, NZ, MA, AC, HA, SI, SI: Data collection or management. MA, AC, HA, SI: Data analysis. MA, AC, HA, SI: Manuscript writing/editing. NBN, AUR, SM, NZ, MA, AC, HA, YK, SI: Final approval of the version to be published.

Ethics approval and Informed consent to participate: The present study protocol was reviewed and approved by the Institutional Review Board of Pakistan Kidney and Liver Institute and Research Centre Lahore, Pakistan (approval number: Ref # PKLI-IRB/AP/219).

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