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Study Of Clinicopathological Correlation Of Retroperitoneal Tumor In J.L.N. Medical College, Ajmer (Rajasthan)

[1]Dr. Ravindra Singh Chaudhary, [2]Dr. Astha Pachori, [3]Dr. Geeta Pachori, [4]Dr. Purnima Pachori, [5]Dr.Tushar Bayla, [6]Dr. Gurcharan Kaur, [7]Dr. Grishma Tamoli

[1,5,6,7]P.G. Resident, [3]Senior Professor and Head, [4]Senior Professor,
[2,4]Department of Obstetric and Gynaecology, [1,3,6,7]Department of Pathology
[1,3,4,6,7]J.L.N. Medical College, Ajmer
[2]Indra Gandhi Medical College, Shimla
[5]Department of Biochemistry , SMS Medical College, Jaipur

***Corresponding Author:**
Dr. Geeta Pachori
Senior Professor and Head of Department Pathology , J.L.N. Medical College , Ajmer

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Abstract

Background: Retroperitoneal tumors (RPTs) are rare, heterogeneous neoplasms that often present late and require multidisciplinary management. Limited regional data exist on their clinicopathological patterns.

Objectives: To evaluate the clinicopathological correlation of RPTs in a tertiary care setting, with emphasis on organ involvement, clinical features, histopathological patterns, and diagnostic accuracy of clinical impressions.

Methods: This prospective study included 130 patients with RPTs diagnosed in the Department of Pathology, JLN Medical College, Ajmer (Feb 2023–Jul 2024). Clinical, radiological, and histopathological data were recorded. Lesions were classified per WHO guidelines. Statistical analysis was performed using Chi-square test; $p<0.05$ was significant.

Results: Most patients were aged 61–70 years (44.62%) with male predominance (89.62%). The prostate was the most affected organ (82.31%), followed by kidney and rectum (5.77% each). Abdominal pain (99.62%) and urinary symptoms (retention 84.62%, frequency/urgency 81.92%) were common. Benign prostatic hyperplasia (BPH) was the predominant histopathological diagnosis (64.23%), followed by carcinoma prostate (18.85%) and gastrointestinal malignancies. Clinical diagnosis showed high concordance with histopathology (sensitivity 92.31%, specificity 100%, accuracy 92.86%; $p<0.001$).

Conclusion: RPTs in this population predominantly affect older males, with the prostate as the commonest site. Strong clinicopathological correlation highlights the value of structured clinical assessment supported by imaging and histopathology for accurate diagnosis. Early multidisciplinary evaluation can optimize patient outcomes.

Keywords: NIL

Introduction

The retroperitoneum, located between the peritoneal cavity and posterior abdominal wall, contains structures of mesodermal and ectodermal origin along with their embryonic remnants [1]. It is bounded superiorly by the diaphragm and 12th rib, inferiorly by the pelvic diaphragm, anteriorly by the posterior parietal peritoneum, and posteriorly by the vertebral column and associated musculature [2].

Retroperitoneal tumors (RPTs) are rare neoplasms within this space, arising from fat, muscle, nerves, vessels, lymphatics, or retroperitoneal organs such as kidneys, adrenal glands, pancreas, and pelvic organs

[3–6]. Invasive tumors may involve major vessels and ureters [7]. About 70–80% of primary retroperitoneal soft tissue tumors are malignant, though they comprise only 0.1–0.2% of all malignancies [8]. Common types include liposarcoma, leiomyosarcoma, and undifferentiated pleomorphic sarcoma in adults, while neuroblastoma predominates in children [9,10]. Benign tumors (≈20%) are often neurogenic or teratomatous [11].

Diagnosis relies on imaging—CT and MRI—for size, extent, and relation to adjacent structures, though histological confirmation is essential. CT-guided core biopsy facilitates FNCLCC grading, and molecular techniques such as miRNA analysis or FISH may aid subtype identification [12,13,15].

Surgical resection with negative margins (R0) offers the best prognosis, often requiring multiorgan resection. Multidisciplinary care is crucial, especially for high-grade sarcomas requiring neoadjuvant therapy [9,12].

Despite global advances in diagnostic and therapeutic strategies, retroperitoneal tumors remain poorly understood due to their rarity, late presentation, and histological diversity. In the Indian context—particularly in regions like Ajmer—there is limited clinicopathological data to guide effective management. Given the wide variation in presentation, histology, and prognosis, a systematic study of retroperitoneal tumors, including their clinical manifestations and histological subtypes, is essential. This study aims to analyze the distribution of RPTs by age, sex, and site, classify them per WHO guidelines, and correlate clinical findings with histopathological outcomes to better inform diagnostic and therapeutic strategies in this regional population.

Material and methods

Patient Selection

All patients diagnosed with retroperitoneal tumors in the Department of Pathology, JLN Medical College and Associated Hospitals, Ajmer, from February 2023 to July 2024 were considered. A total of 130 patients were enrolled based on a calculated sample size using the Daniel formula (32% expected prevalence, 95% confidence level, 8% allowable error). Inclusion criteria comprised tumors arising from retroperitoneal structures such as the bladder, ureter, colon, kidneys, adrenal glands, pancreas, uterus, ovaries, lymph nodes, and soft tissues. Patients with parietal swellings from skin or abdominal wall, bleeding diathesis, prolonged prothrombin time, or local skin infection at the aspiration site were excluded.Specimen Handling and Histopathological Processing

All biopsy specimens received in 10% neutral buffered formalin were grossly examined, sectioned (~5 mm), paraffin-embedded, and cut at 3–5 µm. Standard processing included fixation, graded alcohol dehydration, xylene clearing, paraffin embedding, and Harris Hematoxylin & Eosin staining. Nuclei stained blue and cytoplasm pink; special stains were applied when required.

Data Collection and Classification

Demographic, clinical, radiological, and histopathological data were recorded. Lesions were classified as inflammatory, benign, malignant, or suspicious for malignancy, and categorized per WHO tumor classification.

Statistical Analysis

Data were analyzed using SPSS. Categorical variables were presented as frequencies/percentages, continuous variables as mean ± SD. Associations were assessed with Chi-square test; $p < 0.05$ was considered significant.

Results

Most patients were aged 61–70 years (44.62%), followed by 71–80 years (22.69%) and 51–60 years (15.38%). Only 1.15% were in the 20–30 age group. There was a marked male predominance—233 out of 260 cases (89.62%) were male. Organ involvement showed the prostate as the most affected site (82.31%), followed by kidneys and rectum (5.77% each), colon (2.69%), and pancreas (2.31%)(Table 1). Clinical features included abdominal pain in nearly all patients (99.62%), urinary retention (84.62%), urgency/frequency (81.92%), hematuria (64.23%), and palpable mass (38.85%)(Table 2). Less common symptoms included bleeding per rectum (2.69%), constipation (2.31%), and vomiting (1.92%).Clinical diagnoses were most commonly BPH (66.15%) and prostate carcinoma (16.15%). Other diagnoses included rectal and renal cell carcinoma (5.77% each), colon carcinoma (2.69%), and others(Table 3). Histopathology confirmed BPH in 64.23% and prostate carcinoma in 18.85%. Other malignancies

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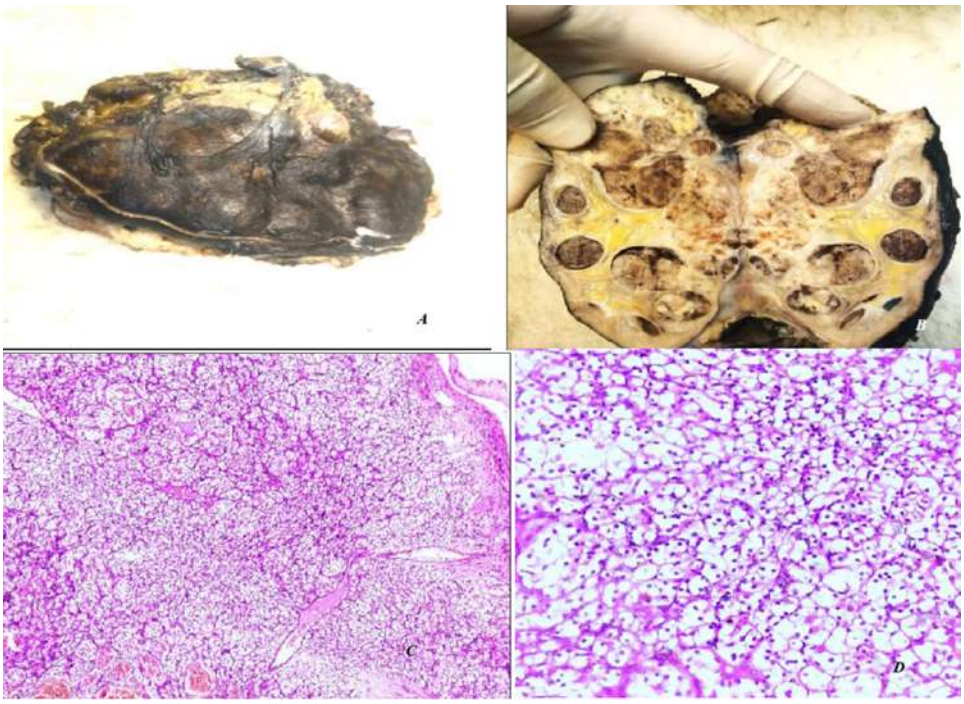
included rectal (5.77%), renal (5.38%), and colon carcinoma (3.08%). One case (0.38%) was pheochromocytoma. Symptom correlation showed significant association ($p<0.001$) between urinary symptoms and prostate conditions; bleeding per rectum with rectal carcinoma (46.67%); vomiting in colon (50%) and pancreatic cancer (25%). Malignancy status revealed 63.85% benign and 36.15% malignant tumors. Clinical diagnosis showed 92.31% sensitivity, 100% specificity, 100% PPV, 50% NPV, and 92.86% accuracy ($p<0.001$), indicating excellent diagnostic performance.

Figure 1a: Renal cell carcinoma case grossly showing External surface Grey brown capsulated. Figure 1b:Renal cell carcinoma typical cross–section show grey yellow solid cystic spherical neoplasm of Kidney Figure 1c:Renal cell carcinoma clear cell shows nested pattern and sheets of cells with clear cytoplasm along with thin walled vessels.(H&E Stain, 10X Figure 1d:Renal cell carcinoma clear cell Showing round to polygonal cells with abundant clear or granular cytoplasm with inconspicuous nucleoli. (H&E Stain, 40X)



Results

Table 1: Distribution of the cases according to organ involve

Organ	Number of patients	Percentage %
Prostate	214	82.31
Kidney	15	5.77
Rectum	15	5.77
Colon	7	2.69
Pancreas	6	2.31
Anal canal	2	0.77
Adrenal mass	1	0.38

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Total	260	100

Table 2: Distribution of the cases according to clinical features

Clinical Features	Number of patients	Percentage %
Pain abdomen	259	99.62
Retention of urine	220	84.62
Frequency/ urgency of micturation	213	81.92
Hematuria	167	64.23
Mass	101	38.85
Bleeding per rectum	7	2.69
Constipation	6	2.31
Vomiting	5	1.92

Table 3: Distribution of Cases According to Clinical and Histopathological Diagnosis (n = 260)

Diagnosis	Clinical Diagnosis n (%)	Histopathological Diagnosis n (%)
Benign Prostatic Hyperplasia (BPH)	172 (66.15%)	167 (64.23%)
Carcinoma Prostate	42 (16.15%)	49 (18.85%)
Rectal Carcinoma	15 (5.77%)	15 (5.77%)
Renal Cell Carcinoma	15 (5.77%)	14 (5.38%)
Colon Carcinoma	7 (2.69%)	8 (3.08%)
Pancreas Carcinoma	5 (1.92%)	4 (1.54%)
Anal Canal Carcinoma	3 (1.15%)	2 (0.77%)
Adrenal Carcinoma / Pheochromocytoma	1 (0.38%)	1 (0.38%)

Table 4: Association of clinical features according to histopathological diagnosis

Clinical Feature (N)	BPH (n=167)	Ca Prostate (n=49)	Pheochro mocytoma (n=1)	RCC (n=14)	Ca Rectal (n=15)	Anal Canal Carcino ma (n=2)	Ca Colon (n=8)	Ca Pancreas (n=4)	P Value
Pain Abdomen (N=259)	166 (99.4%)	49 (100%)	1 (100%)	14 (100%)	15 (100%)	2 (100%)	8 (100%)	4 (100%)	NS
Retention	166 (99.4%)	48 (97.96%)	0 (0%)	3 (21.43%)	1 (6.67%)	0	1 (12.5%)	1 (25%)	<0.001 S

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of Urine (N=220)									
Hematuria (N=167)	113 (67.66%)	40 (81.63%)	0 (0%)	12 (85.71%)	1 (6.67%)	0	1 (12.5%)	0 (0%)	<0.001 S
Frequency (N=213)	160 (95.81%)	47 (95.92%)	0 (0%)	3 (21.43%)	1 (6.67%)	0	1 (12.5%)	1 (25%)	<0.001 S
Vomiting (N=5)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	4 (50%)	1 (25%)	<0.001 S
Constipation (N=2)	2 (1.2%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	NS

Table No 5: Diagnostic accuracy of clinical diagnosis against histopathological diagnosis(Gold Standard)

Clinical Diagnosis	Histopathological Malignant n (%)	Histopathological Benign n (%)	Total (n)
Malignant	70 (70.71%)	18 (11.18%)	88
Benign	29 (29.29%)	143 (88.82%)	172
Total	99 (100%)	161 (100%)	260

Chi-square = 94.377 with 1 degree of freedom; P <0.001S

Discussion

In this prospective study, the prostate was the most frequently involved organ (82.31%), followed by kidney and rectum (5.77% each), consistent with earlier reports highlighting urogenital predominance in retroperitoneal malignancies [16–19]. Abdominal pain (99.62%) and urinary symptoms—retention (84.62%), frequency/urgency (81.92%), hematuria (64.23%)—were the leading presentations, aligning with findings from Sun et al. [18], Dutta et al. [19], Zhang et al. [20], and Pujani et al. [21].

BPH (66.15%) and carcinoma prostate (16.15%) were the most common clinical diagnoses, with histopathology showing similar distribution—BPH (64.23%) and carcinoma prostate (18.85%). This pattern matches prior literature on urogenital and gastrointestinal tumor predominance [18–21].

Symptom–pathology correlation showed urinary retention strongly associated with BPH and carcinoma prostate, hematuria with RCC and prostate carcinoma, and bleeding per rectum with rectal carcinoma ($p<0.001$), consistent with Choi and Ro [16], Sun et al. [18], and Pujani et al. [21].

Diagnostic accuracy of clinical impressions was high (sensitivity 92.31%, specificity 100%, accuracy 92.86%), comparable to findings by Choi and Ro [16], Begum et al. [17], and Zhang et al. [20]. Most patients were aged 61–70 years, with marked male predominance (89.62%), corroborating trends in previous studies [17–20,23].

Multiplicity was observed in 80.38% of cases, in line with reports of multifocal disease in retroperitoneal tumors [18,20,22,24]. Benign tumors constituted 63.85% and malignant 36.15%, matching proportions reported by Sassa [24] and Zhang et al. [20]. PAS positivity (19 cases) was most frequent in carcinoma prostate (52.63%) and correlated with tumor differentiation and aggressiveness, as noted by Sun et al. [18], Zhang et al. [20], and Lin et al. [22].

Conclusion

Retroperitoneal tumors in this cohort predominantly affected older males, with the prostate as the most common site. Abdominal pain and urinary symptoms

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were the main clinical features. Clinical diagnosis showed high concordance with histopathology, particularly in prostatic and renal tumors. The findings underscore the value of thorough clinical evaluation supported by imaging and histopathology. This study contributes important regional data and reinforces the need for multidisciplinary management and early tissue diagnosis to improve outcomes.

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