

Histomorphological Study of Mesenchymal Tumours of Uterine Corpus- A Study of 492 Cases

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*Corresponding author: Dr. Nischita Budihal | Received: 01.06.2019 | Accepted: 10.06.2019 | Published: 22.06.2019
DOI:10.21276/sjpm.2019.4.6.3

Abstract

Background: Difference between the benign and malignant counterparts of mesenchymal tumours is significant due to the differences in the clinical outcome and the role of the surgical pathologist in making this distinction (especially in difficult cases) cannot be underestimated.² The aim of the current study is to evaluate the histomorphological features of mesenchymal tumours of uterine corpus. **Materials and methods:** was undertaken in the Department of Pathology, JJM Medical College, Davangere over a period of two years from July 2010- June 2012. **Results:** Out of the 492 cases, majority were benign tumours accounting to 485(98.58%) cases, followed by 6(1.22%) cases of malignant tumours and one (0.20%) smooth muscle tumour of uncertain malignant potential (STUMP). **Conclusion:** Differentiation between the benign and malignant counterparts of mesenchymal tumours is through the use of multivariate criteria; that is, criteria that involves several microscopic features such as differentiated cell type, presence and type of tumor necrosis, the degree of cytologic atypia, the mitotic index, and the relationship to surrounding normal structures, including extrauterine sites. Morphological features supported by proper usage of IHC markers will help in arriving at the final diagnosis.

Keywords: Leiomyoma, Leiomyosarcoma, Mesenchymal, MMMT, Sarcoma, Uterus.

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INTRODUCTION

Uterine mesenchymal tumours are a heterogeneous group of neoplasms that can frequently be diagnostically challenging [1]. The most common benign and malignant tumours are leiomyoma and leiomyosarcoma respectively. Considerably less common are the tumours of endometrial stromal origin [2].

Diverse histological features of uterine leiomyomas are responsible for an erroneous diagnosis of malignancy [3]. The diagnosis of malignant uterine smooth muscle tumours has important prognostic and therapeutic implications [4]. Difference between the benign and malignant counterparts of mesenchymal tumours is significant due to the differences in the clinical outcome and the role of the surgical pathologist in making this distinction (especially in difficult cases) cannot be underestimated [1].

This study is proposed to be undertaken because these tumours continue to be the major cause of morbidity and the leading indication for hysterectomy.

2003 WHO CLASSIFICATION OF MESENCHYMAL AND MIXED TUMOURS OF THE UTERUS

Mesenchymal tumours

- **Endometrial stromal and related tumours**
 - Endometrial stromal sarcoma, low grade
 - Endometrial stromal nodule
 - Undifferentiated endometrial sarcoma
- **Smooth Muscle Tumours**
 - Leiomyosarcoma
 - Epithelioid variant
 - Myxoid variant
 - Smooth muscle tumours of uncertain malignant potential
 - Leiomyoma, not otherwise specified
 - Histological variants
 - Mitotically active variant
 - Cellular variant
 - Haemorrhagic cellular variant
 - Epithelioid variant
 - Myxoid
 - Atypical variant
 - Lipoleiomyoma variant

- Growth pattern variants
 - Diffuse leiomyomatosis
 - Dissecting leiomyoma
 - Intravenous leiomyomatosis
 - Metastasizing leiomyoma
- **Miscellaneous mesenchymal tumours**
 - Mixed endometrial stromal and smooth muscle tumour
 - Perivascular epithelioid cell tumour
 - Adenomatoid tumour
 - Other malignant mesenchymal tumours
 - Other benign mesenchymal tumours

Mixed Epithelial and Mesenchymal Tumours

- Carcinosarcoma (malignant mullerian mixed tumour; metaplastic carcinoma)
- Adenosarcoma
- Carcinofibroma
- Adenofibroma
- Adenomyoma
- Atypical polypoid variant [5]

BRIEF REVIEW OF MESENCHYMAL TUMOURS ENCOUNTERED IN THE PRESENT STUDY

BENIGN TUMOURS

LEIOMYOMA

A benign neoplasm composed of smooth muscle cells with a variable amount of fibrous stroma [1], most commonly affects the body of the uterus [6].

It is present in 20-30% of women over 30 years of age [6, 7] rising to more than 40% in those over 40 years old [8].

Leiomyomas are spherical and firm; they bulge above the surrounding myometrium from which they are easily shelled out. The cut surfaces are white to tan, with a whorled trabecular pattern. One of the most striking features is the very sharp line of demarcation between the tumor and the surrounding myometrium [6]. Cystic degeneration can occur, and some leiomyomas may become extensively calcified. Hemorrhage, edema, myxoid change, hypercellular foci, and cellular hypertrophy occur in leiomyomas in women who are pregnant or taking progestins [5, 7].

On microscopy, typical leiomyomas are composed of whorled, anastomosing fascicles of uniform fusiform smooth muscle cells. The spindle-shaped cells have indistinct borders and abundant fibrillar eosinophilic cytoplasm [5, 7] separated by a greater or lesser amount of well vascularised connective tissue [9, 10]. MFs usually are infrequent [9].

ADENOMYOMA including ATYPICAL POLYPOID ADENOMYOMA (APA)

A lesion composed of benign epithelial usually endometrial glands and mesenchymal components in

which mesenchymal component is fibromyxomatous [4]. The APA is a rare polypoid tumour, usually involving the lower uterine segment [11]. It is characterized by proliferation of complex and atypical endometrial glands with squamous morular differentiation with cellular smooth muscle and myofibromatous stroma [12].

Peiguo *et al.*, showed the utility of CD10 in distinguishing between endometrial stromal sarcoma and uterine smooth muscle tumours in 34 cases and concluded that diffuse CD10 immunoreactivity is a very useful positive predictive marker for ESS [13].

ENDOMETRIAL STROMAL NODULE (ESN)

Benign tumour composed mainly of endometrial stromal cells, represent less than a quarter of endometrial stromal tumours [7]. Characteristically, a solitary, well delineated, round or oval, fleshy nodule [5, 14]. The most important single criterion for the diagnosis of ESN is the finding of a non-infiltrative border of the tumour. Focal irregularities in the form of lobulated or finger-like projections into the adjacent myometrium that are not >3 mm and are not >3 in number may be seen [7]. ESNs consist of cells that closely resemble normal proliferative-phase endometrial stromal cells [10, 13, 15]. A reticulin network encircles individual cells. Small uniformly distributed arterioles are invariably present [7].

SMOOTH MUSCLE TUMOR OF UNCERTAIN MALIGNANT POTENTIAL (STUMP)

If a tumour shows any unusual combinations of histologic features that do not satisfy the Stanford criteria for LMS, a diagnosis of uterine STUMP is appropriate [16].

MALIGNANT TUMOURS

LEIOMYOSARCOMA

A malignant neoplasm composed of cells demonstrating smooth muscle differentiation [5]. Approximately 1 of every 800 smooth muscle tumours of the uterus is a leiomyosarcoma [7]. The median age of women with leiomyosarcoma is 50–55 years [5, 7].

Most leiomyosarcomas are intramural. A valuable feature is the loss of the sharp line of demarcation that separates tumour from the normal myometrium [6]. The cut surface is gray-yellow or pink, often with areas of necrosis and haemorrhage [7]. Microscopically, conventional leiomyosarcoma is cellular composed of fascicles of spindle cells with abundant eosinophilic cytoplasm. The nuclei are fusiform, usually have rounded ends, and are hyperchromatic with coarse chromatin and prominent nucleoli.⁵

Tumor cell necrosis is typically prominent. The mitotic index is typically in excess of 15 MF/10

HPF. The main criteria used to diagnose leiomyosarcoma of the uterus are the presence of nuclear atypia, a high mitotic index, and coagulative tumor cell necrosis [1, 7].

ENDOMETRIAL STROMAL SARCOMA, LOW GRADE

ESS is a tumour of endometrial stromal cells that invades the myometrium. Low grade stromal sarcoma (LGSS) is a rare malignant tumour that comprise only about 0.2% of all female genital tract malignancies [14]. LGSS may present as a solitary, well delineated and predominantly intramural mass. The sectioned surface appears yellow tan, and the tumour has a softer consistency [5, 9].

Microscopically, the tumours are typically cellular and composed of uniform, oval to fusiform cells of endometrial stromal type [5, 9]. Nuclear atypia is mild. The tumours may contain a plexiform of small blood vessels, mimicking physiologic spiral arterioles. Myometrial invasion and vascular invasion are the two most important features used to distinguish between ESS and ESN. The mitotic rate of low-grade ESS is usually less than 3 MF/10 HPF [9].

UNDIFFERENTIATED ENDOMETRIAL SARCOMA (UES)

It is a high graded endometrial sarcoma that lacks specific differentiation and bears no histological resemblance to endometrial stroma.⁵ It usually occurs in postmenopausal women who present with abnormal vaginal bleeding and uterine enlargement [17].

UES usually presents as one or more tan-yellow to grey, fleshy intracavity polypoid mass. Haemorrhage and necrosis are often conspicuous [5, 7, 17]. Myometrial invasion is common [13, 17]. On microscopy, UES has a diffuse and destructive infiltrative pattern [17]. The neoplastic cells exhibit marked cellular atypia and abundant mitotic activity exceeding 10 MF/10 HPF [5, 17]. Coagulative tumour necrosis is common and sometimes extensive. Vascular invasion by tongues and plugs of tumour is present in most tumours [17].

CARCINOSARCOMA (Malignant Mullerian Mixed Tumour (MMMT); metaplastic carcinoma)

A neoplasm composed of an admixture of malignant epithelium and mesenchymal components [5]. Carcinosarcoma (MMMT) accounts for 2–5% of all malignancies of the uterine corpus typically occur in elderly postmenopausal women [5, 11].

Carcinosarcoma are typically large, bulky polypoid masses, filling the uterine cavity and prolapsing through the cervical os. The cut surface is usually fleshy, and often shows areas of haemorrhage,

necrosis and cystic change. Occasionally, bone or cartilage can be present [11]. Myometrial invasion is frequently seen [5, 11].

On microscopic examination, MMT is composed of distinctive and admixed malignant appearing epithelial and mesenchymal elements. The sarcomatous components may be either homologous or heterologous (50% of cases). In the homologous type, the sarcoma-like component resembles fibrosarcoma, malignant fibrous histiocytoma, high grade endometrial stromal sarcoma, leiomyosarcoma, undifferentiated sarcoma or combination thereof. The heterologous tumour most often contains malignant cartilage or skeletal muscle in the form of rhabdomyoblasts, although other elements such as osteosarcoma and liposarcoma may rarely occur. Presence of eosinophilic hyaline globules is a common feature [11].

METHODOLOGY

This study on histomorphology of mesenchymal tumours of uterine corpus was undertaken in the Department of Pathology, JJM Medical College, Davangere over a period of two years from July 2010- June 2012.

Material for the study consisted of hysterectomy specimens, myomectomy, debulking and polypectomy specimens which were sent for histopathological examination to the Department of Pathology, JJM Medical College from Bapuji Hospital, Chigateri General Hospital and also from private hospitals in and around Davangere. Relevant clinical data was collected from the hospital and laboratory records.

The specimens were received in 10% formalin; after adequate fixation were subjected to thorough gross examination and appropriate sections were taken. After tissue processing, multiple 4-6µ thick paraffin sections were stained with hematoxylin and eosin. Special stains and immunohistochemistry were used wherever necessary.

RESULTS

Among 12,285 surgical specimens received for histopathological examination in the Department during the study period. 1914 were hysterectomies, 25 were myomectomies, 3 were debulking specimens and one was polypectomy specimen.

Of the total 1943 specimens, 492 cases were mesenchymal tumours (including 8 cases of mixed epithelial and mesenchymal tumours).

BEHAVIOUR OF TUMOURS: (Table-1)

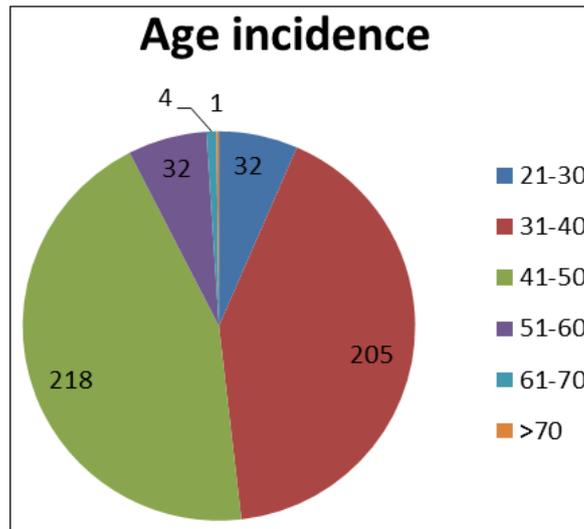
Table-1: Distribution of cases according to the behaviour of the tumours

Behaviour of tumours	No of cases	Percentage (%)
Benign	485	98.58
Uncertain	1	00.20
Malignant	6	01.22
Total	492	100

AGE

In the present study, patients were aged between 3rd to 8th decades of life. The youngest was 21 years and the oldest was 75 years. Majority of the

patients (85.98%) were in 4th and 5th decades of life, with the peak incidence in 5th decade (44.31%) and only one patient in 8th decade. Mean age for all tumours under the study was 42yrs.



Graph I: Pie chart showing age incidence of tumours

HISTOPATHOLOGICAL DIAGNOSIS: (Table-2)

Table-2: Histopathological diagnosis

Histopathological diagnosis	No of cases	Percentage
Leiomyoma	427	86.79
Leiomyoma with adenomyosis	50	10.16
Adenomyoma	4	0.82
Adenomyosis+ adenomyoma	1	0.20
STUMP	1	0.20
Endometrial stromal nodule	2	0.41
Low grade stromal sarcoma	1	0.20
Undifferentiated sarcoma	1	0.20
Atypical polypoid adenomyoma	1	0.20
Leiomyosarcoma	2	0.41
Malignant mixed mullerian tumour	2	0.41
Total	492	100

**BENIGN TUMOURS
LEIOMYOMA**

Leiomyoma was the most common tumour 96.95% of all the tumours under study. Of 477 cases of leiomyoma, 468 (98.11%) cases showed features of

conventional leiomyoma and nine cases showed variants of leiomyomas (1.89%). Of these, four cases were lipoleiomyomas, two atypical leiomyoma, one cellular leiomyoma, one apoplectic leiomyoma and one case showed multilocular cystic leiomyoma (Fig 1 & 2)

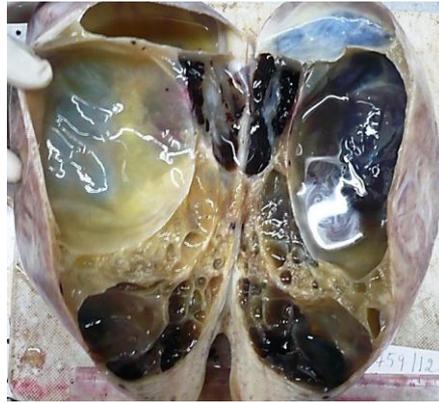


Fig-1: Cut surface of multilocular cystic leiomyoma

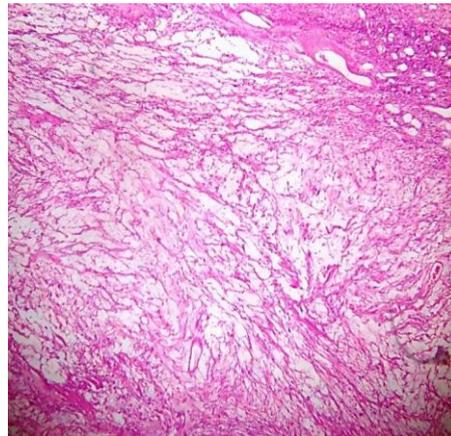


Fig-2: Marked splaying of the individual smooth muscle fibers (H & E)

ADENOMYOMA

A total of six cases were diagnosed as adenomyoma of the 492 tumours under study. Of these, five cases (1.02%) were conventional adenomyoma and one (0.2%) was atypical polypoid adenomyoma.

Atypical polypoid adenomyoma (APA)

In our study, diagnosis of APA was made in a 50yr female who presented with bleeding P/V of 3months duration. P/V: showed a polypoidal mass protruding through the cervical os (Fig-3). External surface of the hysterectomy specimen received showed a polypoidal mass protruding through the cervical os.

The mass was grey white and measured 6x5x5cm on cut section.

On microscopy, polyp consisted of epithelial and mesenchymal components arranged in lobulated architecture. Epithelial component showed glands with mild to moderate structural and cytologic atypia (Fig-4). Mesenchymal component consisted of interlacing bundles of cellular smooth muscle with 1-2 MFs /10 HPF. Diagnosis was confirmed on immunohistochemistry in which the mesenchymal component showed positive staining for smooth muscle actin (SMA) and negative for CD10 (Fig-5).



Fig-3: Pedunculated polypoid mass arising the lower uterine segment

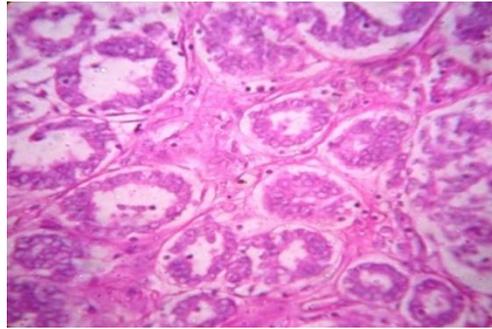


Fig-4: Endometrial glands showing mild from cytologic atypia

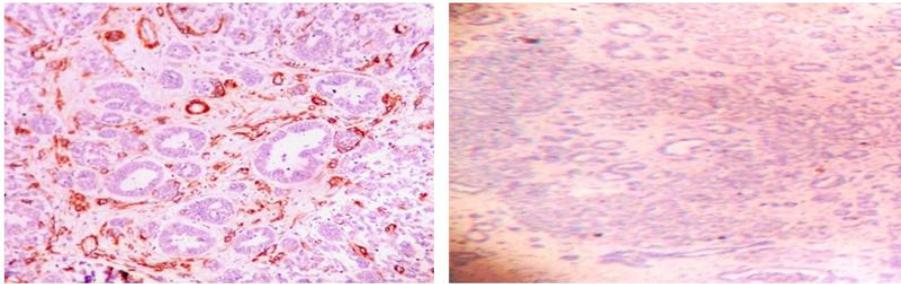


Fig-5: Immunohistochemistry showing diffuse positivity of myofibroblastic cells for SMA and negativity for CD10

ENDOMETRIAL STROMAL NODULE

Two cases of endometrial stromal nodule were diagnosed with the details as shown in Table-3 (Fig 6 & 7).

Table-3: Details of cases of endometrial stromal nodule

Cases	Age (yrs)	Presenting complaint	Type of specimen	Measurement(cm)	Additional features
1	49	Postmenopausal bleeding	Polypectomy	1X1	Intramural leiomyoma
2	45	Mass per abdomen+ pain abdomen	Hysterectomy	10x10	Cystic change



Fig-6: Circumscribed pushing margin with cystic change

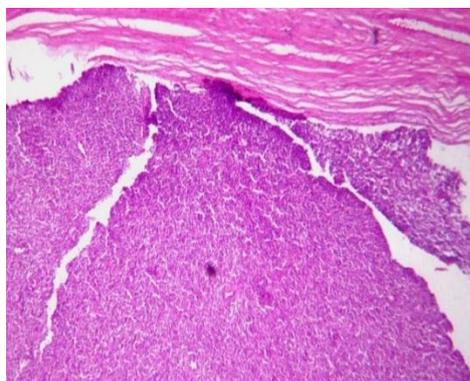


Fig-7: Expansile growth without invasion into the surrounding myometrium

SMOOTH MUSCLE TUMOUR OF UNCERTAIN MALIGNANT POTENTIAL (STUMP)

One case of STUMP was diagnosed in a 63yr old female who came with the complaint of mass per abdomen and pain abdomen. Hysterectomy specimen with the detached mass was received. Mass measured 7x5x3cm, cut section showed grey white variegated appearance with yellowish areas, soft in consistency. On serial sections through the uterus, two subserosal grey white masses were identified.

On microscopy, sections from detached mass showed tumour tissue composed of spindle shaped cells with eosinophilic cytoplasm arranged in fascicles. The nuclei were fusiform with many atypical nuclei noted.

Many of the tumour cells showed single to multiple pleomorphic hyperchromatic nuclei with coarse, smudged chromatin. Few binucleated cells also noted. 6-8 MFs/10 HPFs were noted. Occasional abnormal mitoses were seen. Part of tumour showed hyaline change. Areas of necrosis with mixed inflammatory infiltrate were noted. Sections from two subserosal masses showed typical features of leiomyoma.

**MALIGNANT TUMOURS
LEIOMYOSARCOMA**

In the present study, leiomyosarcoma was diagnosed in two cases with the following details (Table-4):

Table-4: Details of cases of leiomyosarcoma

Cases	Age (yrs)	Presenting complaint	Measurement(cm)	Additional features
1	21	Mass per abdomen+ menstrual disturbance	9x8x4cm	Hyaline+ mucoïd change
2	45	Mass per abdomen	16x12x5cm	Hyaline change

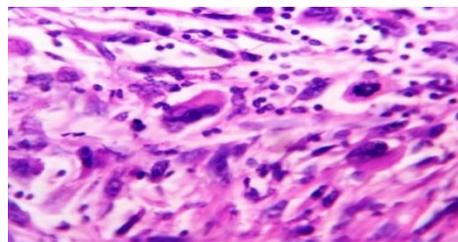


Fig-8: Bizarre cells having hyperchromatic nuclei (H & E)

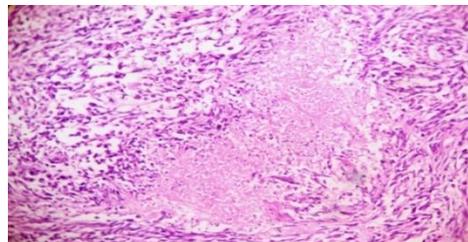


Fig-9: Microphotograph showing tumour cell necrosis (H& E)

LOW GRADE ENDOMETRIAL STROMAL SARCOMA

A 33year old female presented with mass per vaginum. On examination a polypoidal mass was seen protruding from the cervix. Polypectomy was done. Grossly, the polyp measured 3x2x1cm, tan yellow on cut section and soft in consistency.

On microscopy, the tumour was composed of sheets of endometrial stromal cells with small, uniform, round to oval nuclei and scanty cytoplasm with ill-defined cell borders. Proliferation of small vessels and arterioles resembling the endometrial spiral arterioles were uniformly distributed congesting stromal cells. No mitosis seen. Focally few foam cells were seen. At the resected margin broad bands of tumour cells were seen diffusely invading the myometrium. Also noted at the periphery few endometrial glands and endocervical epithelium.

UNDIFFERENTIATED ENDOMETRIAL SARCOMA (UES)

In this study, there was one case (0.94%) of undifferentiated or poorly differentiated sarcoma diagnosed on hysterectomy. The patient was aged 63years and had attained menopause 15 years earlier. Grossly the tumour presented as a variegated mass involving fundus, upper, anterior, posterior and lateral walls with areas of haemorrhage, necrosis and sclerosis.

Histopathology showed diffuse sheets of markedly pleomorphic cells with oval, elongated nuclei and irregular chromatin showing brisk mitotic activity (>10/10 HPFs). Tumour giant cells and bizarre forms were present. Large areas of haemorrhage and necrosis were evident. Myometrial invasion was marked. No heterologous or epitheloid component seen and the cervix and adnexa were free from tumour.

MALIGNANT MIXED MULLERIAN TUMOUR

Was diagnosed in two cases (Table-5).

Table-5: Details of cases of malignant mixed mullerian tumour

Cases	Age (yrs)	Presenting complaint	Measurement(cm)	Additional features
1	60	Mass per abdomen+pain abdomen	7x5x3cm	Heterologous elements(rhabdomyosarcoma)
2	75	Mass per abdomen	12x11x4cm	Multinucleated giant cells Hyaline globules



Fig-10: Polypoidal mass protruding from endometrial cavity

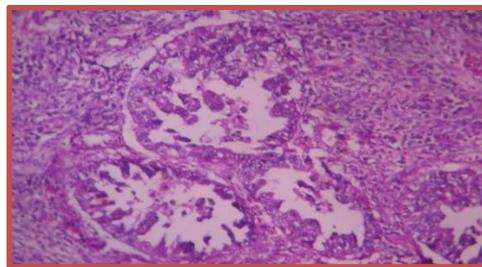


Fig-11: Admixture of malignant the glands & malignant spindle cell stroma

DISCUSSION

BEHAVIOUR OF TUMOURS

Uterine sarcomas account for less than 3% of uterine malignancies [18, 19] which was also the finding in our study where the malignant tumours constituted to 1.22%.

AGE

Majority of the patients (85.98%) were in 4th and 5th decades of life which was in correlation with the study by Ramesh [20] and Manjula *et al.*, (Table-6) [21].

Mean age incidence for all tumours was 42yrs in our study, where as it was 35yrs according to Lele S [1].

Table-6: Comparison of age incidence of tumours in various studies

Age range(yrs.)	Ramesh (1999) [20]	Manjula (2006) [21]	Present study (2012)
21-30	10.50%	5.68%	06.50%
31-40	49.37%	47.72%	41.67%
41-50	34.08%	39.77%	44.31%
51 and above	6.06%	6.58%	07.52%

BENIGN TUMOURS LEIOMYOMA

Table-7: Incidence of leiomyomas in various studies

Author	Year	Percentage
Reddy and Malathy [22]	1963	3.19
Shaw [23]	1971	10.0
Tiltman [24]	1980	56.00
Cramer and Patel [25]	1992	77.00
Wallach EE <i>et al.</i> , [26]	2004	20-40
Flierman PA <i>et al.</i> , [27]	2005	20
Present study	2012	24.54

MULTILOCLAR CYSTIC LEIOMYOMA

It is an example of extreme hydropic degeneration in leiomyoma [28]. It was diagnosed in a

26 year old female who presented with mass per abdomen and bladder disturbance since 7months. Coard K and Plummer J reported a case of multilocular cystic

leiomyoma in a 49 year old patient who also presented with mass per abdomen [28].

Microscopic features of marked hydropic degeneration correlated with that reported by Coard K and Plummer J [1].

Adenomyoma

5 cases of conventional adenomyoma were diagnosed constituting to 1.02%. The findings in this study correlated with the study by Tahlan *et al.*, [29].

Atypical Polypoid Adenomyoma (APA)

Table-8: Comparison of age (mean age) incidence of atypical polypoid adenomyoma in various studies

Authors	Year of study	Mean age (yrs.)
Fukunaga M <i>et al.</i> , [30]	1995	33
Kempson RL [31]	2000	35-45
Ota S <i>et al.</i> , [32]	2003	40.66
Ohishi Y [33]	2008	31.28
Angelo D [11]	2011	39
Present study	2012	50

Diagnosis was confirmed on immunohistochemistry, in which the mesenchymal component showed positive staining for smooth muscle actin (SMA) and negative for CD10. These observations were similar to those made by Ohishi *et al.*, [33] in their study. In conclusion, a complete lack of CD10 expression or a fringe like staining pattern in the myofibromatous stroma of APA should lead to a more accurate diagnosis of APA [33].

ENDOMETRIAL STROMAL NODULE (ESN)

ESN was diagnosed in two cases, mean age was found to be 47 years. In the study done by Diongi *et al.*, [14], the mean age of ESN was 53years.

SMOOTH MUSCLE TUMOUR UNCERTAIN MALIGNANT POTENTIAL (STUMP)

In the present study one case of STUMP was encountered, accounting for 0.2% of all mesenchymal tumours. The patient was 63 year old female, who presented with mass per abdomen and pain abdomen. The mean age of occurrence of STUMP was 43 years in the study by Guntupalli *et al.*, [34].

Microscopic features were consistent with the study by Guntupalli *et al.*, [34], Kempson RL [31], Nucci *et al.*, [35], D angelo *et al.*, [36], Olive E [37] and Hendrickson *et al.*, [5].

**MALIGNANT TUMOURS
LEIOMYOSARCOMA**

Table-9: Comparative percentage of leiomyosarcoma in various studies

Author	Year	Percentage
Liebson <i>et al.</i> , [38]	1990	0.69
William Parker [39]	1998	0.075
Waldmann J <i>et al.</i> , [40]	2003	<1.0
Present study	2012	0.41

Blom R [8] and Angelo ED [41] also noted high mitotic activity and severe nuclear atypia along with coagulative necrosis which were also found in our study.

LOW GRADE ENDOMETRIAL STROMAL SARCOMA

A 33year old female presented with mass per vaginum. Cut section showed a tan yellow discolouration and soft in consistency in accordance with the study by Xue WC *et al.*, (Table-10) [17].

Table-10: Comparison of age incidence in low grade stromal sarcomas

Authors	Year	Age incidence (years)
Baker PM [42]	2005	53
Chan JK <i>et al.</i> , [43]	2008	52
Xue WC <i>et al.</i> , [17]	2011	40-55
Present study	2012	48

UNDIFFERENTIATED ENDOMETRIAL SARCOMA (UES)

Evans has encountered seven cases of this rare tumour in his study of uterine sarcomas, who presented with a mean age of 62 years. A single case of UES in our study was a 63 year old patient with post-

menopausal bleeding. Histological features in the present study also correlated with the study by Evan. The age incidence and clinical behavior of these sarcomas were more like those of carcinosarcomas although there was absence of carcinomatous component here. Evans suggested that it might be

reasonable to consider poorly differentiated sarcomas as a monophasic variant of MMMT [44].

MALIGNANT MIXED MULLERIAN TUMOUR (MMMT)

The current study includes two cases of MMMT, with the mean age of 67.5 years, which was in

correlation with the study by Hart [45] and Sangle NA [1] where the mean age was found to be 68 and 65 years respectively but in the study by Ho SP [12] slightly younger age of occurrence was noticed (Table-11).

Table-11: Comparison of mean age of MMMT with other studies

Author	Year	Mean Age (years)
Hart [45]	1995	68
Ho SP <i>et al.</i> , 12	2002	56.5
Sangle NA [1]	2011	65
Present study	2012	67.5

SUMMARY

This is a prospective study on the histomorphological features of mesenchymal tumours of uterine corpus undertaken in the Department of Pathology, JJM Medical College, Davangere.

Salient features observed in this study were:

1. A total of 492 cases were studied over a period of two years of which
 - 485(98.58%) cases were benign, followed by six (1.22%) cases of malignant tumours and one (0.20%) of STUMP.
 - Benign tumours included 477 cases of leiomyoma followed by six cases of adenomyoma and two cases of ESN.
 - Malignant tumours diagnosed were two cases of leiomyosarcoma and two cases of MMMT and one case of LGSS and one case of UES.
 - Patients were aged between 3rd to 8th decades of life. The youngest was 21 years and the oldest was 75 years. Mean age for all tumours under the study was 42 yrs.
2. Patients were aged between 3rd to 8th decades of life. The youngest was 21 years and the oldest was 75 years. Mean age for all tumours under the study was 42 yrs.
3. Fibroid uterus was the commonest clinical diagnosis 305 (61.99%). Leiomyoma 477 (96.95%) was found to be the most common histopathological diagnosis followed by adenomyoma 6 (1.21%). Of the 477 cases of leiomyoma, 50 had co existing adenomyosis.
 - Of 477 cases of leiomyoma, 468 (98.11%) cases showed features of conventional leiomyoma and nine cases showed variants of leiomyomas (1.89%). Of these, four cases were lipoleiomyomas, two atypical leiomyoma, one cellular leiomyoma, one apoplectic leiomyoma and one case showed multilocular cystic leiomyoma.

4. Of six cases of adenomyoma, five cases were of conventional adenomyoma and one APA. The diagnosis of APA was confirmed on immunohistochemistry by positive staining for SMA and negative staining for CD10.
5. Two cases of endometrial stromal nodule were diagnosed, one in hysterectomy specimen and one polypectomy specimen.
6. One case of STUMP was diagnosed in a 63 year old female.
7. Two cases of leiomyosarcoma were diagnosed both of which were debulking specimens indicating aggressiveness of the tumour.
8. Two case of undifferentiated sarcoma in a 63 year old female and one of low grade endometrial stromal sarcoma in a 33 year old female.
9. MMMT was diagnosed in two cases both in postmenopausal age group and one had heterologous rhabdomyosarcoma component.

CONCLUSION

Mesenchymal tumours of the uterus, other than the leiomyomas are uncommon. Proper pathological study of these tumours is predicted on careful gross examination and adequate sectioning.

Three major goals of the pathologic examination of potentially malignant mesenchymal tumours are to determine the type of tumour margin (expansile or infiltrating), to evaluate the depth of myometrial invasion, and to determine whether the tumour involves the serosa or extends beyond the uterus. Tissue sampling should be taken with these requirements in mind.

Smooth muscle tumours and endometrial stromal tumours represent the two main categories of mesenchymal tumours of the uterus. Although their diagnosis is straight forward in most cases, difficulties arise with particular leiomyoma variants, especially highly cellular leiomyoma (often confused with an endometrial stromal tumour) and leiomyoma with bizarre nuclei, mitotically active leiomyoma which may cause concern for leiomyosarcoma.

Differentiation between the benign and malignant counterparts of mesenchymal tumours is through the use of multivariate criteria; that is, criteria that involves several microscopic features such as differentiated cell type, presence and type of tumor necrosis, the degree of cytologic atypia, the mitotic index, and the relationship to surrounding normal structures, including extrauterine sites.

Morphological features supported by proper usage of IHC markers will help in arriving at the final diagnosis.

REFERENCES

- Sangle, N. A., & Lele, S. M. (2011). Uterine mesenchymal tumours. *Indian Journal of Pathology and Microbiology*, 54(2): 243-253.
- Robboy, S. J., & McCluggage, W. G. (2009). Mesenchymal Uterine tumours, other than pure smooth muscle neoplasms, and adenomyosis. In: Robboy, S. J., Mutter, G. M., Prat, J., Bentley, R., Russel, P., Anderson, M. C., editors. *Textbook of Pathology of Female Reproductive Tract*. 2nd edn, Elsevier, Churchill Livingstone: 427-55.
- Watanabe, K., & Suzuki, T. (2006). Uterine leiomyoma versus leiomyosarcoma: a new attempt at differential diagnosis based on their cellular characteristics. *Histopathology*, 48(5), 563-568.
- Toledo, G., & Oliva, E. (2008). Smooth muscle tumors of the uterus: a practical approach. *Archives of pathology & laboratory medicine*, 132(4), 595-605.
- Hendrickson, M. R., Tavassoli, F. A., Kempson, R. L., McCluggage, W. G., Haller, U., & Kubik-Hutch, R. A. (2003). Mesenchymal tumors and related lesions. In: Tavassoli FA, Deville P, editors. *World Health Organization Classification of tumours. Pathology and genetics of Tumors of the Breast and Female Genital Organs*. Lyon: IARC Press, 233-244.
- Robboy, S. J., Bentley, R. C., Butnor, K., & Anderson, M. C. (2000). Pathology and pathophysiology of uterine smooth-muscle tumors. *Environmental health perspectives*, 779-784.
- Zaloudek, C. J., Hendrickson, M. R., & Saslow, R. A. (2011). Mesenchymal tumours of the Uterus. In: Kurman, R. J., Elleson, L. H., Ronett, B. M. Blaustein's *Pathology of the Female Genital Tract*. 6th edn, Springer: 453-527.
- Blom, R., Guerrieri, C., Stal, O., Malmstrom, H., & Simonsen, E. (1998). Leiomyosarcoma of the Uterus: A Clinicopathologic, DNA Flow Cytometric, p53, and mdm-2 Analysis of 49 Cases. *Gynecol Oncol*, 68: 54-61.
- Baker, P., & Oliva, E. (2007). Endometrial stromal tumours of the uterus: a practical approach using conventional morphology and ancillary techniques. *Journal of clinical pathology*, 60(3), 235-243.
- Gayathri, B. N., Rao, K. S., & Chatura, K. R. (2011). Reappraisal of endometrial stromal sarcoma: Report of four cases with review of literature. *Journal of South Asian Federation of Obstetrics and Gynecology*, 3(2): 57-59.
- D'Angelo, E., & Prat, J. (2011). Pathology of mixed Müllerian tumours. *Best Practice & Research Clinical Obstetrics & Gynaecology*, 25(6), 705-718.
- Ho, S. P., & Ho, T. H. (2002). Malignant mixed Mullerian tumours of the uterus-a ten-year experience. *Singapore medical journal*, 43(9), 452-456.
- Chu, P. G., Arber, D. A., Weiss, L. M., & Chang, K. L. (2001). Utility of CD10 in distinguishing between endometrial stromal sarcoma and uterine smooth muscle tumors: an immunohistochemical comparison of 34 cases. *Modern Pathology*, 14(5), 465-471.
- Dionigi, A., Oliva, E., Clement, P. B., & Young, R. H. (2002). Endometrial stromal nodules and endometrial stromal tumors with limited infiltration: a clinicopathologic study of 50 cases. *The American journal of surgical pathology*, 26(5), 567-581.
- D'Angelo, E., Spagnoli, L. G., & Prat, J. (2009). Comparative clinicopathologic and immunohistochemical analysis of uterine sarcomas diagnosed using the World Health Organization classification system. *Human pathology*, 40(11), 1571-1585.
- Ip, P. P., & Cheung, A. N. (2011). Pathology of uterine leiomyosarcomas and smooth muscle tumours of uncertain malignant potential. *Best practice & research Clinical obstetrics & gynaecology*, 25(6), 691-704.
- Xue, W. C., & Cheung, A. N. (2011). Endometrial stromal sarcoma of uterus. *Best Practice & Research Clinical Obstetrics & Gynaecology*, 25(6), 719-732.
- Banu, N. S., & Manyonda, I. T. (2004). Myometrial tumours. *Current Obstetrics & Gynaecology*, 14(5), 327-336.
- Fadare, O. (2011). Heterologous and rare homologous sarcomas of the uterine corpus: a clinicopathologic review. *Advances in Anatomic Pathology*, 18(1), 60-74.
- Ramesh, B. H. (1999). Surgical pathology of uterine corpus (Dissertation). *Davangere, Kuvempu University*.
- Manjula, K., Rao, K. S., & Chandrashekar, H. R. (2011). Histomorphological study of degenerative changes in leiomyoma of myometrium. *National Journal of Basic Medical Sciences*, 1(2): 70-74.
- Reddy, D. B., & Malathy, P. M. (1963). Fibromyoma uterus. *Journal of Obstet & Gynecol of India*, 13: 54.
- Howkins, J., Bowne, G. (1985). New growths of uterus. In: *Shaws Text Book of Gynaecology*. 9th edn. BI Publications Pvt, Bombay.

24. Anderson, M. C. (1991). Female genital tract. In: Symmer SW ed. Systemic Pathology, 3rd edn, Edinburgh, Churchill Livingstone.
25. Cramer, S. F., & Patel, A. (1992). The nonrandom regional distribution of uterine leiomyomas: a clue to histogenesis?. *Human pathology*, 23(6), 635-638.
26. Wallach, E. E., & Vlahos, N. F. (2004). Uterine myomas: an overview of development, clinical features, and management. *Obstetrics & Gynecology*, 104(2), 393-406.
27. Flierman, P. A., Oberyé, J. J. L., Van Der Hulst, V. P. M., & De Blok, S. (2005). Rapid reduction of leiomyoma volume during treatment with the GnRH antagonist ganirelix. *BJOG: An International Journal of Obstetrics & Gynaecology*, 112(5), 638-642.
28. Coard, K., & Plummer, J. (2007). Massive multilocular cystic leiomyoma of the uterus: an extreme example of hydropic degeneration. *Southern medical journal*, 100(3), 309-313.
29. Tahlan, A., Nanda, A., & Mohan, H. (2006). Uterine adenomyoma: a clinicopathologic review of 26 cases and a review of the literature. *International journal of gynecological pathology*, 25(4), 361-365.
30. Fukunaga, M., Endo, Y., Ushigome, S., & Ishikawa, E. (1995). Atypical polypoid adenomyomas of the uterus. *Histopathology*, 27(1), 35-42.
31. Kempson, R. L., & Hendrickson, M. R. (2000). Smooth muscle, endometrial stromal, and mixed Müllerian tumors of the uterus. *Modern Pathology*, 13(3), 328-342.
32. Ota, S., Catusus, L., Matias-Guiu, X., Bussaglia, E., Lagarda, H., Pons, C., ... & Prat, J. (2003). Molecular pathology of atypical polypoid adenomyoma of the uterus. *Human pathology*, 34(8), 784-788.
33. Ohishi, Y., Kaku, T., Kobayashi, H., Aishima, S., Umekita, Y., Wake, N., & Tsuneyoshi, M. (2008). CD10 immunostaining distinguishes atypical polypoid adenomyofibroma (atypical polypoid adenomyoma) from endometrial carcinoma invading the myometrium. *Human pathology*, 39(10), 1446-1453.
34. Guntupalli, S. R., Ramirez, P. T., Anderson, M. L., Milam, M. R., Bodurka, D. C., & Malpica, A. (2009). Uterine smooth muscle tumor of uncertain malignant potential: a retrospective analysis. *Gynecologic oncology*, 113(3), 324-326.
35. Nucci, M. R. (2009). Tumours of female genital tract: myometrium. In Fletcher CD (ed.). *Diagnostic histopathology of tumours*. 3rd ed. Philadelphia: Churchill Livingstone Elsevier, 289.
36. D'Angelo, E., & Prat, J. (2010). Uterine sarcomas: a review. *Gynecologic oncology*, 116(1), 131-139.
37. Oliva, E. (2009). Pure mesenchymal and mixed mullerian tumors of the uterus. *Gynecologic pathology*, 261-329.
38. Leibsohn, S., d'Ablaing, G., Mishell Jr, D. R., & Schlaerth, J. B. (1990). Leiomyosarcoma in a series of hysterectomies performed for presumed uterine leiomyomas. *American journal of obstetrics and gynecology*, 162(4), 968-976.
39. Parker, W. H., Fu, Y. S., & Berek, J. S. (1994). Uterine sarcoma in patients operated on for presumed leiomyoma and rapidly growing leiomyoma. *Obstetrics and gynecology*, 83(3), 414-418.
40. Waldmann, J., Stachs, A., Terpe, H., Stropahl, G., & Makovitzky, J. (2005). Smooth muscle tumours of the uterine corpus: a clinicopathologic study with immunohistochemical aspects. *Anticancer research*, 25(3A), 1559-1565.
41. D'Angelo, E., Espinosa, I., Ali, R., Gilks, C. B., van de Rijn, M., Lee, C. H., & Prat, J. (2011). Uterine leiomyosarcomas: tumor size, mitotic index, and biomarkers Ki67, and Bcl-2 identify two groups with different prognosis. *Gynecologic oncology*, 121(2), 328-333.
42. Chan, J. K., Kavar, N. M., Shin, J. Y., Osann, K., Chen, L. M., Powell, C. B., & Kapp, D. S. (2008). Endometrial stromal sarcoma: a population-based analysis. *British journal of cancer*, 99(8), 1210-1215.
43. Evans, H. L. (1982). Endometrial stromal sarcoma and poorly differentiated endometrial sarcoma. *Cancer*, 50(10), 2170-2182.
44. Sreenan, J. J., & Hart, W. R. (1995). Carcinosarcomas of the female genital tract. A pathologic study of 29 metastatic tumors: further evidence for the dominant role of the epithelial component and the conversion theory of histogenesis. *The American journal of surgical pathology*, 19(6), 666-674.