



## PSEUDOCAPSULAR BASED UTERINE FIBROIDS

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### ABSTRACT

Uterine fibroids are the most common benign tumor of the uterus in reproductive aged women. The fibroid pseudocapsule is a structure formed surrounding the uterine fibroid that in the uterus separates the myoma which is compressed myometrium from normal myometrium. Pseudocapsule is surrounded by dense nerves and blood vessels. The exact cause is not known but African descent, nulliparity, obesity, genetic predisposition, estrogen are commonly associated with it. Most of the uterine fibroids has no symptoms and do not require any treatment. Vaginal bleeding, abdominal bloating and backache are the common symptoms, and few women may present with infertility or pregnancy-related complications. In those with abnormal uterine bleeding, one should exclude other causes of abnormal vaginal bleeding including endometrial cancer. Diagnosis of uterine fibroid is mostly established by bimanual examination and pelvic ultrasonography. Patients are treated depending on their fertility potential and desire for future pregnancy. Hysteroscopy is the preferred option for cervical and submucous fibroids. Laparoscopic myomectomy is the best recommended surgical procedure to treat myoma these days but larger myomas are treated by laparotomic myomectomy by preserving pseudocapsule. Patients wishing to preserve their fertility are best treated by intracapsular laparoscopic myomectomy. A laparoscopic approach is more advantageous than laparotomy. The pseudocapsule should be avoided from damage during the surgical procedure to preserve neurovascular and neurotransmitters surrounding myomas for correct uterine healing and other great advantages through intracapsular myomectomy. Intracapsular method of fibroid removal increase future fertility potential and decreases adhesion.

**Keywords:** Uterine fibroids, Fibroid pseudocapsule, endometrial cancer, pregnancy- related complications, Myomectomy, Laparoscopy, Fertility, Laparotomy.

## INTRODUCTION

Uterine leiomyomas are the most common pelvic tumor in women of reproductive age. It affects 25% of women in reproductive age. They are the benign monoclonal tumors arising from the smooth muscle cells of the myometrium and may be single or multiple. The myoma pseudocapsule is a surgical-anatomical entity formed by extracellular matrix surrounding the fibroid that separates the myoma from normal myometrium [1,2]. Fibroid is anchored to the pseudocapsule by connective bridges, but lacks its own true vascular pedicle. [3] The pathogenesis of leiomyoma is not well understood. Genetic predisposition, environmental factors, steroid hormones and growth factors are important in fibrotic processes and angiogenesis, all play a role in the formation and growth of uterine fibroids. [4] Dapunt et al, -showed a vascular network surrounding myoma, as a pseudocapsule, so that if the detachment of the myoma occurred into the pseudocapsule, less bleeding occurred during myomectomy. Fox et al-studied fibroids by ultrastructural microscopy and showed an anatomical structure different than the normal myometrium: fibroids had a well-defined regular outline and a surrounding pseudocapsule of compressed muscle fibers. The hypothesis of a fibroid pseudocapsule was also asserted by Vizza et al, -who demonstrated that the pseudocapsule contains fibers that tend to bulge out from the surrounding myometrium and have a firm, whorled, or trabeculate surface. An ultrasonographic evaluation revealed that the pseudocapsule appeared as an echogenic line around myoma, with a wall  $\leq 1$ cm and with reinforcement of distal echoes. Also histological investigations of uterine vascular pseudocapsule have led to a better understanding of the role in the modern invasive myomectomy. The disease is heterogeneous and different fibroids may have different etiologies; many may have multifactorial pathogenesis. [5] Leiomyoma-related effects on the function and structure of the endometrium are the final common pathways in the pathogenesis of excessive bleeding in myomatous uteri and there is evidence of both histological changes in the endometrium and endometrial vasculature in these uteri. Myomas are asymptomatic or with few symptoms in most of the cases but larger myomas can compress surrounding organs, leading to urinary, digestive, or sexual symptoms. It negatively affects fertility, in case of large fibroids or when uterine cavity is distorted. The myoma pseudocapsule has a delicate vascular network rich with neurotransmitters analogous to the neurovascular bundle surrounding the prostate. [6] Despite the frequency with which fibroids are diagnosed and treated, there remains considerable uncertainty and controversy among clinicians and women regarding the best way to manage them. Literature has lack of detailed information concerning myoma pseudocapsule.

## MATERIALS AND METHODS

We obtained all the required information from articles related to the topics, published on different sites Such as Pubmed, Wikipedia, Google and other authorized websites. The information which is in this topic is mostly selected from recent, valid, authorized and relevant articles.

## **Etiology:**

Myomas are generally derived from smooth muscle cells and rest from either vessel walls or uterine musculature. The etiology of leiomyoma is not clear but genetic predisposition, environmental factors, oestrogen, human placental lactogen and growth hormones are implicated in the growth of myomas and oestrogen dependence for their growth is more impressive.<sup>[2]</sup> Known risk factors are African descent, nulliparity, obesity, polycystic ovary syndrome, diabetes, and hypertension. Myomas are rare before puberty and after menopause. In women with hyper-oestrogenism is evidenced by endometrial hyperplasia, dysfunctional metropathia bleeding and endometrial carcinoma. They increase in size during pregnancy and with oral contraceptive pills but cease to grow after menopause. A large dose of progesterone orally for 14 to 21 days of the cycle helps to shrink the tumor size. GnRH also causes shrinkage of the tumor.<sup>[5]</sup> Hypertension is significantly correlated with fibroids but casual relationship is not clear, the hypothesis has been formulated that atherosclerotic injury to uterine blood vessels and the resulting inflammatory state may play a role. Also endocrine factors related to blood pressure such as angiotensin II are suspected to cause fibroid proliferation via angiotensin II type 1 receptor. <sup>[6]</sup> Genetic and hereditary causes are being considered especially for early onset cases. First degree relatives have a 2.5-fold risk, and nearly 6-fold risk when considering early onset cases. Monozygotic twins have double concordance rate for hysterectomy compared to dizygotic twins. Pseudocapsule has similar architecture as normal myometrium but also contains different nerves and neuropeptides and these nerve fibers assist in understanding of etiology of some patterns of fibroids <sup>[7]</sup>

## **Anatomy of the pseudocapsule:**

A typical uterine leiomyoma is a benign monoclonal tumor arising from the smooth muscle cells of the myometrium and containing a large amount of extracellular matrix (ECM, collagen, proteoglycan, fibronectin) and are surrounded by a thin pseudocapsule of areolar tissue and compressed muscle fibers. In microscopic view, the pseudocapsule seems to be a continuous layer between the fibroid and myometrium and is made of thickened collagen fibers and blood vessels which form a vascular ring. The vessels which supply blood to the tumor lie in the capsule and send radial branches into the central portion of the tumor because of this arrangement of blood supply and degeneration is noticeable early. A sonographic “ring of fire”, by echo-color Doppler. The pseudocapsule is separated from surrounding myometrium, forming a hyperechogenic ring that surrounds and defines the myoma. Myoma shows a nodular aspect, a round image, well circumscribed, to enucleate even if they miss a pseudocapsule. The vascular capsule was a substantial feature of fibroids, and that it reached the highest density of blood vessels in large tumors. Pathologists examined the relationship between ultrasound and histological findings of the fibroid's vascular capsule in a series of women using Gn-RH analogues in preoperative treatment before myomectomy. Leiomyomas are benign lesions. However, there is a heterogeneous group of lesions which have some, but not all,

characteristics of malignant disease termed leiomyoma variants. Leiomyoma variants are classified as benign or malignant based upon histologic features. Some leiomyoma variants have histologic findings that make it difficult to define them as benign or malignant (eg, smooth muscle tumors of uncertain malignant potential).<sup>[8]</sup> Ito et al, who performed a histopathologic evaluation of a uterine fibroid and its pseudocapsule, to determine the scientific reason for less blood loss during an intracapsular myomectomy. Macroscopic evaluation of the pseudocapsule and adjacent myometrium showed parallel arrays of extremely dense capillaries and larger vessels that form the capsule. This is separated from the myometrial vasculature by a narrow avascular cleft. Pseudocapsule vessels from the surrounding myometrium formed clusters in the center of the vascular network creating a sort of pedicle, and the veins surrounding the myoma circulated under the pseudocapsule in a plexus. Moreover, biochemical growth factors in the pseudocapsule vessels cause intense angiogenesis in the pseudocapsule, probably promoted by the fibroids. The angiogenesis of the myoma pseudocapsule likely leads to the formation of a “protective” vascular capsule responsible for the supply of blood to the growing tumor. However, studies have demonstrated a dysregulation of various growth factors and their receptors in uterine myomas.<sup>[2,9]</sup>

### **Location and classification:**

Symptoms of fibroids depend on the growth and location. Smaller are symptomatic if they are within the uterine cavity and larger one is asymptomatic if they are outside of the uterus. The types of fibroid are classified according to their location. Fibroids may be single or multiple. Most of the fibroids start in the muscular wall of the uterus and some lesions may develop towards the outside of the uterus or towards the internal cavity because of further growth. Secondary changes that may develop within fibroids are hemorrhage, necrosis, calcification, and cystic changes.<sup>[10]</sup>

1. **Intramural fibroids** – they are the most common type of fibroid and are located within the wall of the uterus, unless large, they may be asymptomatic. And later intramural fibroids may expand inwards, causing distortion and elongation of the uterine cavity. Pseudocapsule is found to be thinner.
2. **Subserosal fibroids** – they are located underneath the mucosal (peritoneal) surface of the uterus and can become very large. They can also grow out in a papillary manner to become pedunculated fibroids. These pedunculated growths can actually detach from the uterus to become a parasitic leiomyoma. Pseudocapsule is thinner in this type too.
3. **Submucosal fibroids** –they are located in the myometrium of the uterus and distort the uterine cavity; even small lesions in this location may lead to bleeding and infertility as pseudocapsule is thicker near endometrial cavity. A pedunculated lesion within the cavity is termed an intracavitary fibroid and can be passed through the cervix.
4. **Cervical fibroids**- they are located in the wall of the cervix (neck of the uterus). Fibroids are rarely

found in the supporting structures (round ligament, broad ligament, or uterosacral ligament) of the uterus that also contain smooth muscle tissue.<sup>[5]</sup>

There are a number of rare conditions in which fibroids metastasize, if they are located in the other parts of the body which are also called parasitic myomas and are diagnosed frequently and may be related or identical to metastasizing fibroids. Mostly they are benign in nature but can be dangerous depending on their location. In leiomyoma with vascular invasion, an ordinary-appearing fibroid invades into a vessel but there is no risk of recurrence. In Intravenous leiomyomatosis, leiomyomata grow in veins with uterine fibroids as their source. Cardiac involvement can be fatal. In benign metastasizing leiomyoma, leiomyomata grow in more distant sites such as the lungs and lymph nodes. The source is not entirely clear. Pulmonary involvement can be fatal. In disseminated intraperitoneal leiomyomatosis, leiomyomata grow diffusely on the peritoneal and omental surfaces, with uterine fibroids as their source. This can simulate a malignant tumor but behaves benignly. They are in most cases still hormone dependent but may cause life-threatening complications when they appear in distant organs. Some sources suggest that a substantial share of the cases may be late complications of surgeries such as myomectomy or hysterectomy. Particularly laparoscopic myomectomy using a morcellator has been associated with a substantially increased risk of this complication.  
[7, 8]

### **Sign and symptoms:**

Most leiomyomas are asymptomatic almost in 50% of the cases. These myomas are detected during routine ultrasound or in gynecological check-up for unrelated symptoms. It may be associated with single symptom or may be present with several complaints depending upon the number, size and location of the tumors. Symptomatic patients usually complain of per vaginal bleeding, painful and heavy periods, abdominal bloating, backache, or infertility. Larger leiomyoma have more symptoms. A sufficiently enlarged uterus due to fibroid can cause pressure sensation, urinary frequency, incontinence, and constipation. It can also be associated with pain during intercourse, depending on the location of the fibroid. Leiomyomas rarely extend laterally to compress the ureter and lead to obstruction and hydronephrosis. Leiomyomas also cause dyspareunia or noncyclical pelvic pain than dysmenorrhea. Leiomyoma can also lead to infertility though the mechanism is not known. If they occur in pregnancy, they can cause miscarriage, bleeding, premature labor or interference with the position of the fetus. Fibroids can also lead to vaginal bleeding and later can cause iron deficiency anemia. <sup>[2, 5]</sup>

### **Diagnosis:**

In majority, the clinical features are clear and elaborate investigations are not required. Leiomyomas are often detected during bimanual examination with findings of uterine enlargement, irregular contour, or both. Urine or serum – hCG is done in reproductive aged women if there is uterine enlargement to rule out

pregnancy. Base line investigation such as hemoglobin and blood grouping is done. Ultrasound which confirms the diagnosis shows specific features of a well defined rounded tumor, hypoechoic with cystic spaces if degeneration has occurred and sometime appears hyperechoic, if there is calcification. Calcification and cystic degeneration create the most distinctive changes in the ultrasonography. It also helps to detect the number, location and size of the fibroids and thus reduces to look for small fibroids during surgery. Ultrasound is also useful in the follow-up cases of fibroids after menopause and following GnRH therapy. But it lacks in detecting sarcomatous changes of fibroids. Magnetic resonance imaging is useful in depiction of size and location of fibroid within the uterus and its greatest ability to detect sarcomatous lesions. [11] 3D ultrasound is important for management decision. For Submucous myoma hysterosalpingography and Sonosalpingography are done and they are used to check the patency of the fallopian tubes in infertility. D&C is required to check endometrial cancer. [4] If pelvic mass is associated with Menorrhagia, dysmenorrhea or infertility then the endometrial cavity should be evaluated for submucous leiomyomas, endometrial polyps, congenital anomalies, or synechiae. Saline-infusion sonography (SIS), hysteroscopy, and hysterosalpingography (HSG) are also important. [2, 5, 11]

### **Treatment of Pseudocapsular based leiomyoma:**

Several treatments are available to remove fibroids and alleviate symptoms, such as conservative surgery, medical therapy, or various novel radiological interventions. [4] Expectant treatment by annual pelvic examination is done for asymptomatic patient regardless of their size and annual ultrasound surveillance. Previously large and asymptomatic patient used to go through surgical removal of myoma but it is not recommended these days and asymptomatic patient are treated expectantly. Infertile women are also managed expectantly. Symptomatic patients are treated via surgical removal of fibroids and limit the risk of recurrence of leiomyoma and pseudocapsule are to be preserved during surgery. Postmenopausal bleeding and pain in women with fibroids should be investigated in the same way as in women without fibroids.

### **Medical therapy:**

Some women who present with symptomatic leiomyomas prefer medical therapy. Leiomyomas regress postmenopausally so choosed just to alleviate the symptoms in some women who are near to menopause. Medical therapies such as NSAIDS are useful in Women with dysmenorrhea have higher endometrial levels of prostaglandins  $F_2$  and  $E_2$  than asymptomatic women. Accordingly, treatment of dysmenorrhea and menorrhagia associated with leiomyomas is based on the role of prostaglandins as mediators of these symptoms. A number of NSAIDs have proved effective for dysmenorrhea, yet there is not one considered to be superior. Prostaglandins are also associated with menorrhagia. **HRT** may cause myoma growth in postmenopausal women, but it does not appear to cause clinical symptoms. Both combination oral contraceptive pills (COCs) and progestins have been used to induce endometrial atrophy and decrease

prostaglandin production in women with leiomyomas. **Androgens**, both danazol and gestrinone have been found to shrink leiomyoma volume and improve bleeding symptoms. [13] But their prominent side effects, which include acne and hirsutism, preclude their use as first-line agents. **GnRH agonists** shrink leiomyomas by targeting the growth effects of estrogen and progesterone. They initially stimulate receptors on pituitary gonadotropes to cause a supraphysiologic release of both LH and FSH. Also called a flare, this phase typically lasts 1 week. With their long-term action, however, agonists downregulate receptors in gonadotropes, thus creating desensitization to further GnRH stimulation. Correspondingly, decreased gonadotropin secretion leads to suppressed estrogen and progesterone levels 1 to 2 weeks after initial GnRH agonist administration. GnRH agonists are used as a preoperative adjunct to surgery because it offers great advantages. Their use decreases menorrhagia and may allow correction of anemia. Decreased uterine size as a result of treatment may allow a less-complicated or extensive surgical procedure. But high cost and its side effect limit their long-term use [14]. Synthetically derived **GnRH antagonists** have also been studied for treatment of leiomyomas. Although their profound hypoestrogenic effects are similar to those of GnRH agonists, they avoid the initial gonadotropin flare and have a more rapid action. Daily subcutaneous injections induce leiomyoma shrinkage comparable with GnRH agonists. [13, 14, 15] **Mifepristone**, also known as RU486, is the most widely available antiprogestin for treatment of leiomyomas. It has proved effective in decreasing leiomyoma volume and clinical symptoms. [16]

### **Surgical procedure:**

- ❖ Women who have completed family and symptomatic patient, hysterectomy is done but in asymptomatic patient intracapsular myomectomy is preferred to preserve fertility by reserving pseudocapsule and which requires further intervention. There is currently no evidence to substantiate performing a hysterectomy for an asymptomatic leiomyoma for the sole purpose of alleviating the concern that it may be malignant. Removal of fibroids that distort the uterine cavity may be indicated in infertile women, where no other factors have been identified, and in women about to undergo in vitro fertilization treatment. Concern of possible complications related to fibroids in pregnancy is not an indication for myomectomy, except in women who have experienced a previous pregnancy with complications related to these fibroids. Women who have fibroids detected in pregnancy may require additional fetal surveillance when the placenta is implanted over or in close proximity to the fibroid. In women who present with acute hemorrhage related to uterine fibroids, conservative management consisting of estrogens, hysteroscopy, or dilatation and curettage may be considered, but hysterectomy may become necessary in some cases. [17] Uterine artery embolization is used to treat patient who are symptomatic to preserve their uterus in selected cases but they are counseled about possible risk and fertility outcome. [18] Radiofrequency ablation is a minimally invasive treatment for fibroids and fibroids are shrunk by inserting a needle-like device

into the fibroid through the abdomen and heating it with radio-frequency (RF) electrical energy to cause necrosis of cells. The treatment is a potential option for women who have fibroids, have completed child-bearing and want to avoid a hysterectomy. <sup>[19]</sup> Hysterectomy is the definitive and most common surgical treatment for leiomyomas. Hysterectomy for leiomyoma can be performed vaginally, abdominally, or laparoscopically but it is recommended as a last option.

### **Hysteroscopy and vaginoscopy:**

Hysteroscopic myomectomy should be considered as first-line conservative surgical therapy for the management of symptomatic cervical and Submucous myomas located within the uterine cavity. It is important to monitor ongoing fluid balance carefully during hysteroscopic removal of fibroids. Pseudocapsule is thicker near the endometrial cavity and these myomas can be easily reached and enucleated transvaginally but sometime a combined vaginal laparoscopic excision is necessary. With saline solution as the distension medium and under exact pressure and flow control, the visualization of the uterine cavity and its pathology are visible, including the synechiae, septum, and endometrium, and cervical canal, uterine cavity with uterine Ostia, polyps, and fibroids. The most modern system offers continuous suction of resected material. The hysteroscopic resection of these fibroids is easy and is performed with the resectoscopic loop in a slicing manner with bipolar or monopolar current. <sup>[17]</sup>

### **❖ Laparotomic Myomectomy**

A laparotomic myomectomy may be performed if the myoma is >20 cm in diameter, located at a very critical point, or suspected of being a sarcoma. More than 10 fibroids may require a laparotomy. The decision is taken by the surgeon. The indications for myomectomy are severe menorrhagia in the setting of leiomyomas, protracted symptoms not responding to medical management, recurrent pregnancy loss in the presence of myomas, obstruction of pelvic organs (*i.e.* ureter, bowel, bladder, and fallopian tubes) by myomas, rapidly enlarging myomas, infertility resulting from myomas, and myomas of a certain size (still controversial what that size is) when the patient desires to retain fecundity or the uterus. Myomectomy is the most common conservative treatment in gynecology, performed by classical open surgery or by laparoscopy. There is support for performing myomectomy by removing the fibroid from its surrounding structure, the fibroid pseudocapsule-an “intracapsular myomectomy” to preserve pseudocapsule. It is performed by stretching and extracting fibroid tissue directly from the surrounding fibromuscular skeleton, breaking up the fibrous bridges. The pseudocapsule neurovascular bundle is extremely important during myomectomy to promote uterine myometrial healing and, consequently, for uterine reproductive function. In addition, several investigators have recommended limiting resection to those tumors less than 8 to 10 cm because of increased hemorrhage and operating time with larger tumors. <sup>[20]</sup>



### ❖ Laparoscopic Myomectomy

Laparoscopic leiomyoma resection may be performed with successful outcomes and it's the best method to preserve pseudocapsule these days. New advancements in surgery, including the use of laparoscopic myomectomy by an Intracapsular technique and magnification of the myoma pseudocapsule to enhance visualization. Fibroid detachment occurring inside the pseudocapsule causes less bleeding, spares the neurovascular bundle and promotes better uterine healing. The maintenance of myometrial integrity after laparoscopic myomectomy maintains uterine function and therefore improves reproductive outcomes, including labor. Excision sites have been associated with uteroperitoneal fistula or with uterine rupture during subsequent pregnancy. At times, laparoscopic technique requires conversion to laparotomy due to bleeding or difficult tumor enucleation. It is unclear whether laparoscopic myomectomy is associated with greater risk of recurrence. [21, 22] This method is most often done for subserous and intramural myomas and in case of pedunculated myomas.

### ❖ Robotic Myomectomy

The da Vinci robot offers a more precise technique for every surgery, including myomectomies. Robotic suturing is easier and faster. However, three-dimensional vision and articulated instruments may also serve the same purpose. Robotic surgery is fascinating, but a financial revolution would have to occur for it to be accepted throughout the world, not only for cancer surgery but also for procedures such as myomectomy. [22]

### Complications:

Most common complications of myomas are seen during pregnancy because pregnancy can cause an increase in the size of the fibroids, increases vascularity and high tendency to undergo degenerative changes like hyaline changes and cystic degeneration. Red degeneration also can occur due to softening of the surrounding supportive connective tissue, the capillaries tend to rupture and blood effuses out into the myoma causing a diffuse reddish discoloration. This can lead to severe and acute abdominal pain. Rest and analgesics are given first then laparotomy is performed. Fibroids increases risk of abortion or miscarriage, preterm labour, antepartum hemorrhage, labour dystocia and postpartum hemorrhage, puerperal sepsis and uterine inversion. Subserous pedunculated myomas can cause torsion if they undergo rotation with severe abdominal pain. It is very rare condition. [23, 24] Another extremely rare condition of myoma is sarcomatous changes which is malignant. Hysterectomy with bilateral salpingo-oophorectomy is done followed by radiation therapy. But radical hysterectomy is preferred for its best cure. Chemotherapy is also added to reduce recurrences. [25]

## DISCUSSIONS

Laparoscopic intracapsular myomectomy by preserving pseudocapsule in subserous and intramural type reduces complications, correct healing and increases fertility and delivery outcome. Its use has become more important than other surgical procedure in uterine myoma because of its advantages. Anatomic pattern, fibroid behavior and involvement of the pseudocapsule in a hormonal environment have to be demonstrated in both reproductive aged and postmenopausal patients. Pseudocapsule anomalous vascularization, which is similar to malignant neoplastic tissue vessels present in malignant tumors are to be studied. Increasing knowledge of pseudocapsule angiogenesis and neurovascular fibers could play an important role in understanding the origin, recurrence, and correct treatment of uterine leiomyomas. What has been said should stimulate research on the influence of angiogenic growth factors on fibroid pseudocapsule and on the neuroanatomical significance of the fibroid pseudocapsule, to explain the pathobiology of fibroid and pseudocapsule formation, the hormonal influence on pseudocapsule growth and neurovascular development, and the pseudocapsule during the postoperative course. Intracapsular subserous and intramural myomectomy saving the fibroid pseudocapsule showed few early and no late surgical complications, enhanced healing by preserving myometrial integrity and allowed a good fertility rate and delivery outcome. Laparoscopic intracapsular myomectomy is treatment of choice in young women. Recently progress in endoscopic surgery, either laparoscopic or robotic surgery has become an alternative to laparotomy because of its various advantages. The fibroid removal should always be performed inside its pseudocapsule and with a careful stretching, to extract fibroid from the surrounding fibromuscular skeleton, breaking up the fibrous bridges; because the vascular network generally surrounds the myoma, detachment of the myoma occurring inside the pseudocapsule should cause less bleeding. [26, 27,29]

## CONCLUSIONS

There has to be put more concern to learn about pseudocapsule of fibroid in each part of the uterus, the body, the isthmus and cervix to know the presence of neuropeptides and neurotransmitter activity in the neurovascular bundle of fibroid pseudocapsule, may be the causes of pain, infertility and abortions. Impact of hormone on the origin, growth and recurrence of the fibroid capsule, influence of drugs and their effects on uterine healing, imaging by ultrasound has to be focused. [28] The maintenance of myometrial integrity during intracapsular myomectomy allows the facilitation of uterine healing and is of benefit for future reproductive outcome by preserving myometrial integrity and allows for restoration of the uterine musculature. A great advantage of intracapsular laparoscopic myomectomy is the reproducibility of its application for all laparoscopic myomectomies as a safe, feasible, and minimally invasive technique.[27] Intracapsular myomectomy enhances myometrium integrity peripheral to the fibroid site, by preserving the neurovascular bundle and neurotransmitters surrounding fibroids, for uterine healing and restoration of the myometrium

after surgery. Intracapsular myomectomy allows correct myometrial healing, maximizes potential for future fertility and to minimize the risk of labor dystocia or uterine rupture during pregnancy or labor, minimal bleeding, better neurovascular bundle sparing for scar quality, and reduces postoperative adhesion. Laparoscopic myomectomy confers significant advantages in less Intraoperative blood loss, short duration of hospital stay, few therapeutic antibiotic administration and better future fertility. There has to be more research on the fibroid pseudocapsule because of its vital role in gynecological surgery <sup>[28]</sup>

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