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Chocolate cysts (Ovarian endometriomas): A comprehensive review with emphasis on nursing management

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Abstract
Chocolate cysts, clinically termed ovarian endometriomas, represent a severe ovarian manifestation of endometriosis characterized by cystic lesions filled with altered menstrual blood. These lesions are closely associated with chronic pelvic pain, dysmenorrhea, dyspareunia, infertility, and significant psychosocial morbidity, leading to substantial impairment in quality of life among women of reproductive age. Despite advancements in diagnostic imaging and therapeutic strategies, ovarian endometriomas remain clinically challenging due to their chronic course, high recurrence rates, adverse effects on ovarian reserve, and rare malignant potential. This review provides a comprehensive synthesis of current evidence on epidemiology, etiopathogenesis, molecular and inflammatory mechanisms, clinical manifestations, diagnostic approaches, differential diagnosis, medical and surgical management, fertility implications, complications, and prognosis of chocolate cysts. A major focus is placed on integrated nursing management, highlighting the nurse's role in pain control, hormonal therapy support, fertility counseling, perioperative care, psychological support, patient education, and long-term follow-up. Strengthening nursing-led interventions is essential to improving symptom control, treatment adherence, and holistic outcomes in women affected by ovarian endometriomas.

Keywords: Chocolate cyst, ovarian endometrioma, endometriosis, pelvic pain, infertility, nursing management

Introduction
Endometriosis is a chronic, estrogen-dependent inflammatory disorder defined by the presence of endometrial-like tissue outside the uterine cavity. It affects approximately 10-15% of women of reproductive age and is identified in up to half of women presenting with infertility or chronic pelvic pain [1]. Among its various phenotypic expressions, ovarian endometriomas—commonly known as chocolate cysts—represent one of the most clinically significant and structurally destructive forms of the disease.
Chocolate cysts are characterized by thick, dark brown fluid formed due to repeated cyclical bleeding of ectopic endometrial tissue within the ovary. Unlike superficial peritoneal implants, ovarian endometriomas directly compromise ovarian tissue, leading to fibrosis, adhesion formation, follicular depletion, and impaired endocrine function. These pathological changes contribute to persistent pain syndromes, reduced fertility, and diminished ovarian reserve. The chronic and recurrent nature of the condition necessitates long-term multidisciplinary care, in which nursing professionals play a central and continuous role across all stages of management.

Epidemiology and Risk Factors
Ovarian endometriomas most commonly affect women aged 25-40 years and are reported in approximately 17-44% of women diagnosed with endometriosis [2, 3]. Bilateral involvement is observed in nearly one-third of cases. The prevalence is notably higher among women evaluated for infertility, recurrent pelvic pain, or adnexal masses.
Established risk factors include early menarche, shorter menstrual cycles, prolonged menstrual bleeding, nulliparity, delayed childbearing, and a positive family history of endometriosis [4]. Genetic susceptibility, estrogen dominance, immune dysregulation, and environmental exposures further modulate disease risk. Protective factors such as pregnancy, prolonged breastfeeding, and long-term use of combined oral contraceptives reduce cumulative menstrual exposure and appear to lower disease incidence.

Etiopathogenesis
The etiopathogenesis of ovarian endometriomas is multifactorial and complex.

Retrograde Menstruation
Sampson's theory proposes that viable endometrial cells reflux through the fallopian tubes during menstruation and implant on pelvic structures, including the ovary [5]. However, as retrograde menstruation occurs in most women, additional mechanisms are required to explain disease development.

Ovarian Invagination Theory
The ovarian invagination theory is currently regarded as the most plausible explanation for endometrioma formation. Repeated cyclical bleeding from superficial ovarian endometriotic implants leads to progressive invagination of the ovarian cortex, eventually forming a cystic cavity [6].

Coelomic Metaplasia and Stem Cell Theory
Metaplastic transformation of coelomic epithelium and differentiation of stem or progenitor cells into endometrial-like tissue may explain atypical disease distribution and cases occurring without tubal patency [7].
These mechanisms interact with estrogen excess, chronic inflammation, oxidative stress, immune dysfunction, and genetic predisposition to sustain lesion growth.

Molecular and Inflammatory Pathophysiology
Chocolate cysts exhibit a highly inflammatory and oxidative microenvironment. The cyst fluid contains high concentrations of iron, reactive oxygen species, cytokines, prostaglandins, and growth factors. Repeated intracystic hemorrhage leads to iron overload, resulting in oxidative stress, lipid peroxidation, and cellular injury to adjacent ovarian tissue [8].
These molecular disturbances promote fibrosis, adhesion formation, and progressive follicular loss, ultimately reducing ovarian reserve. Chronic inflammation also sensitizes pelvic nerves, explaining persistent pain even after apparent lesion removal.

Clinical Manifestations
Clinical presentation varies widely. Some women remain asymptomatic, while others experience severe and debilitating symptoms. Common manifestations include chronic pelvic pain, progressively worsening dysmenorrhea, deep dyspareunia, infertility or delayed conception, menstrual irregularities, lower back pain, and persistent fatigue [9]. The unpredictable and chronic nature of symptoms often leads to anxiety, depression, sexual dysfunction, and impaired social and occupational functioning.

Diagnostic Evaluation
Clinical Assessment
A detailed clinical history focusing on menstrual patterns, pain characteristics, reproductive goals, and functional impairment is essential. Pelvic examination may reveal adnexal tenderness, fixed ovarian masses, or restricted uterine mobility due to adhesions.

Imaging and Laboratory Evaluation
Transvaginal ultrasonography is the first-line imaging modality, typically demonstrating unilocular or multilocular cysts with homogeneous low-level internal echoes described as a "ground-glass" appearance [10]. MRI is useful in complex cases or when malignancy is suspected, showing characteristic T_1 hyperintensity with T_2 shading [11]. Serum CA-125 may be elevated but lacks diagnostic specificity [12].

Medical Management
Medical therapy aims to suppress ovarian activity, reduce estrogen levels, and alleviate pain. Treatment options include combined oral contraceptives, progestins such as dienogest, gonadotropin-releasing hormone agonists and antagonists, and the levonorgestrel-releasing intrauterine system [13]. While effective for symptom control, medical therapy does not eliminate cysts, and recurrence is common after discontinuation.

Surgical Management
Surgery is indicated for large cysts (>4 cm), severe symptoms refractory to medical therapy, infertility, or suspicion of malignancy.

Laparoscopic Cystectomy
Laparoscopic excision of the cyst wall is considered the gold standard. It provides superior pain relief and lower recurrence rates compared to drainage procedures but may reduce ovarian reserve if healthy tissue is inadvertently removed [14].

Fertility Implications
Ovarian endometriomas impair fertility through mechanical distortion, inflammatory follicular damage, and compromised oocyte quality. Fertility preservation strategies, including oocyte or embryo cryopreservation, should be discussed prior to surgical intervention, particularly in women desiring future fertility.

Integrated Nursing Management of Chocolate Cysts
Nursing management is fundamental to effective care due to the chronic, recurrent, and psychosocially burdensome nature of ovarian endometriomas. Nursing interventions extend across assessment, symptom management, reproductive counseling, perioperative care, psychological support, education, and long-term follow-up.

Nursing Assessment and Early Identification
Nurses play a crucial role in early recognition through comprehensive assessment of menstrual history, pain patterns, reproductive concerns, sexual health, and psychosocial well-being. Use of standardized pain assessment tools enables objective monitoring and evaluation of treatment response.

Pain Management
Pain control is a core nursing responsibility. Nurses implement multimodal strategies combining prescribed analgesics and hormonal therapies with non-pharmacological interventions such as heat therapy, relaxation techniques, guided breathing, posture correction, and sleep hygiene counselling.

Support During Hormonal Therapy
Long-term hormonal treatment requires consistent nursing support. Nurses educate patients regarding treatment goals, expected effects, side effects, and the importance of adherence. Monitoring adverse effects and reinforcing follow-up significantly improve therapeutic outcomes.

Fertility and Reproductive Counselling
Nurses provide empathetic counselling on fertility implications, explain the impact of disease and surgery on ovarian reserve, facilitate referral to fertility specialists, and support informed decision-making regarding assisted reproductive technologies and fertility preservation.

Preoperative Nursing Care
Preoperative care focuses on patient education, anxiety reduction, informed consent reinforcement, and physical and psychological preparation for surgery.

Postoperative Nursing Care
Postoperative nursing management includes pain control, wound care, early ambulation, monitoring for complications, education on activity restrictions, and guidance on recurrence prevention and follow-up.

Psychological Support
Given the association with chronic pain and infertility, nurses assess emotional well-being, provide therapeutic communication, screen for anxiety and depression, and facilitate mental health referrals when necessary.

Patient Education and Long-Term Follow-Up
Education regarding disease chronicity, recurrence risk, lifestyle modification, stress management, and adherence to follow-up is central to sustained disease control. Nurses ensure continuity of care and act as a consistent point of contact within the healthcare system.

Complications
Complications include recurrence, pelvic adhesions, diminished ovarian reserve, cyst rupture, ovarian torsion, and rare malignant transformation into clear cell or endometrioid ovarian carcinoma [15].

Prognosis
Ovarian endometriomas are chronic conditions with a high likelihood of recurrence. Early diagnosis, individualized treatment, fertility-preserving strategies, and sustained nursing follow-up significantly improve long-term outcomes and quality of life.

Conclusion
Chocolate cysts represent a complex and debilitating manifestation of endometriosis with significant physical, reproductive, and psychosocial consequences. Optimal management requires an integrated approach combining medical, surgical, and nursing care. Nursing professionals play a pivotal role in pain management, fertility counseling, perioperative care, psychological support, patient education, and long-term disease monitoring. Strengthening nursing-led interventions is essential to reduce disease burden, enhance treatment adherence, and improve holistic patient outcomes.

Conflict of Interest
Not available

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Not available

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