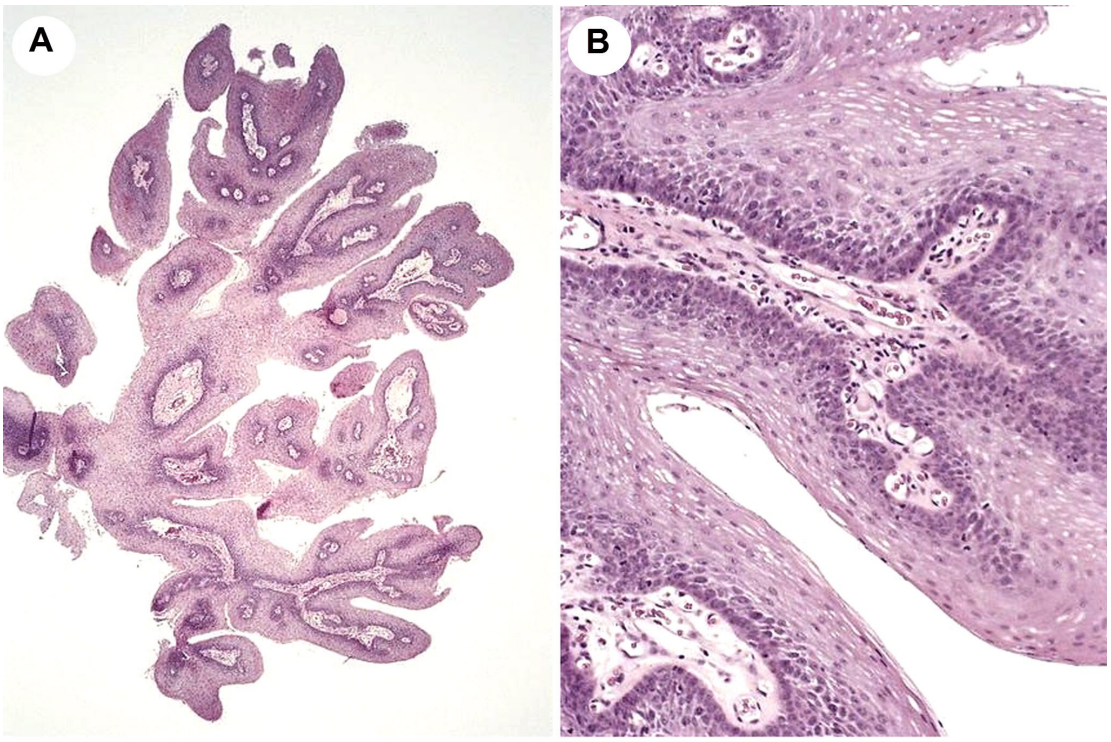
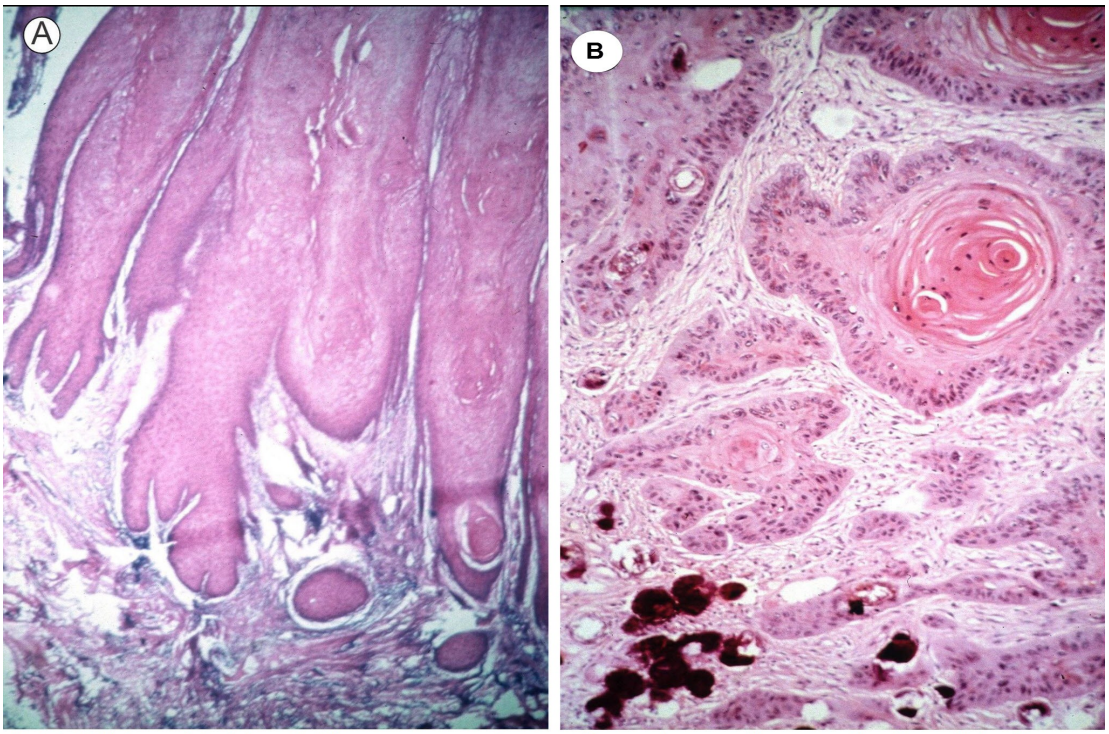
Section

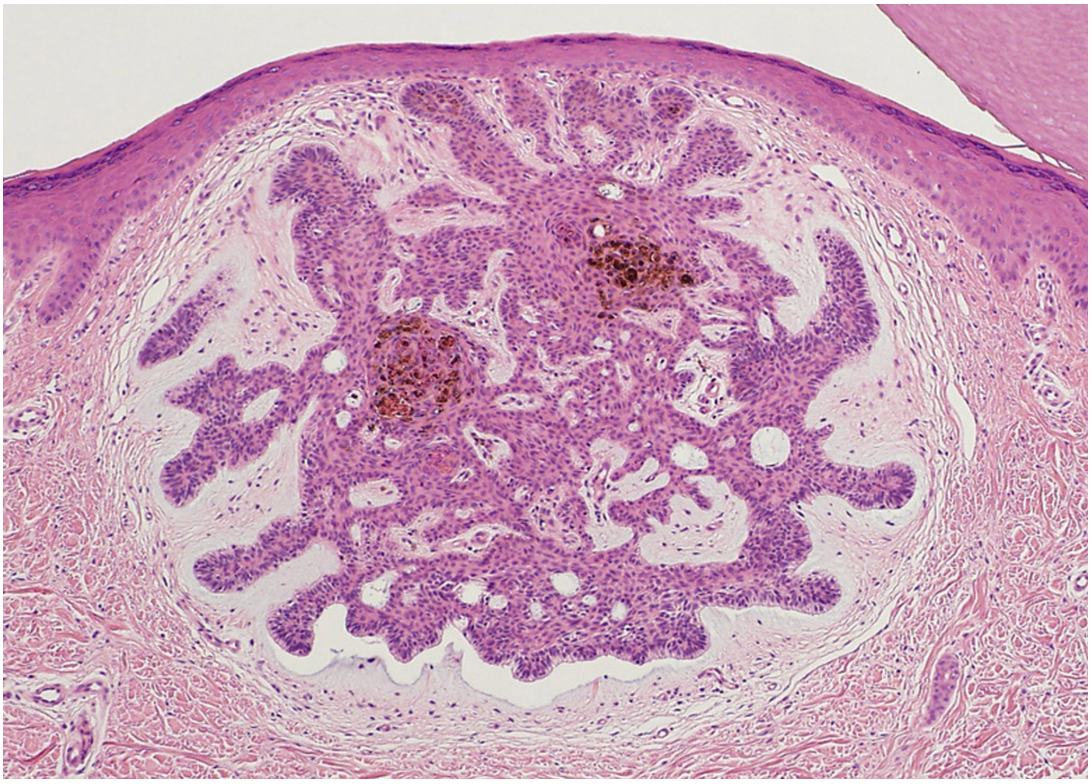
10 Histologic Classification of Tumors



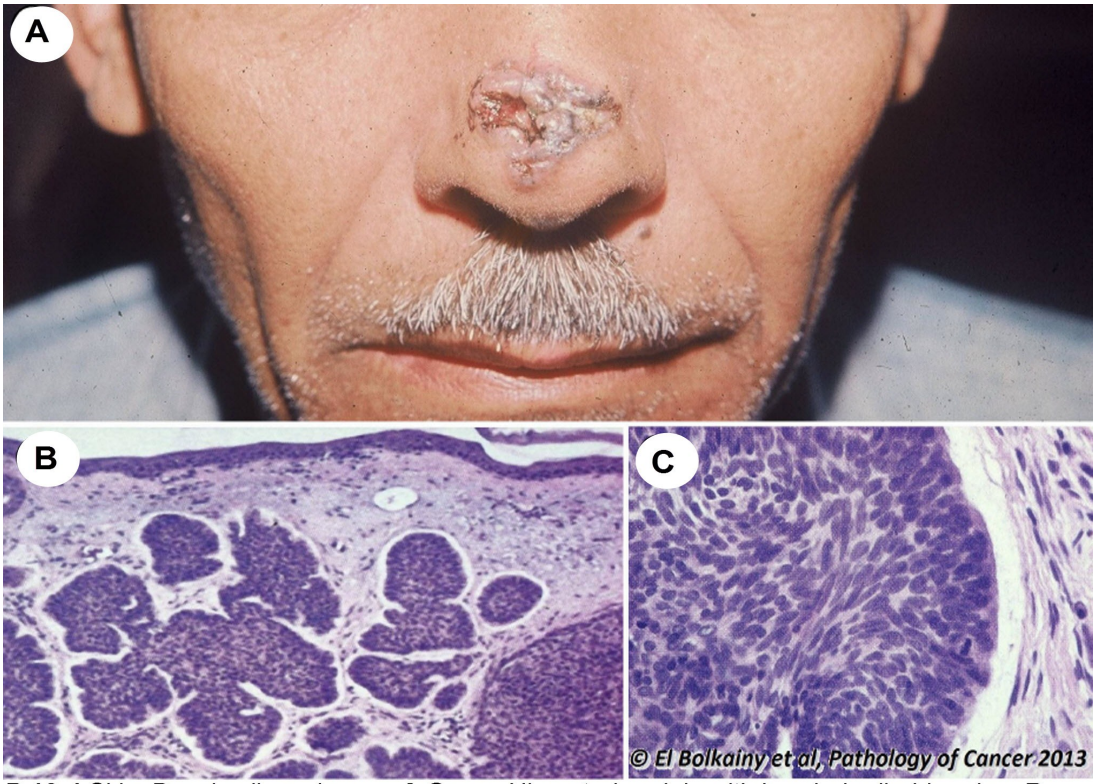
P 13-1. Tongue, squamous papilloma. **A** low and **B** high power. Note the mature squamous epithelium and fibrovascular stroma (Courtesy of PathologyOutlines.com).



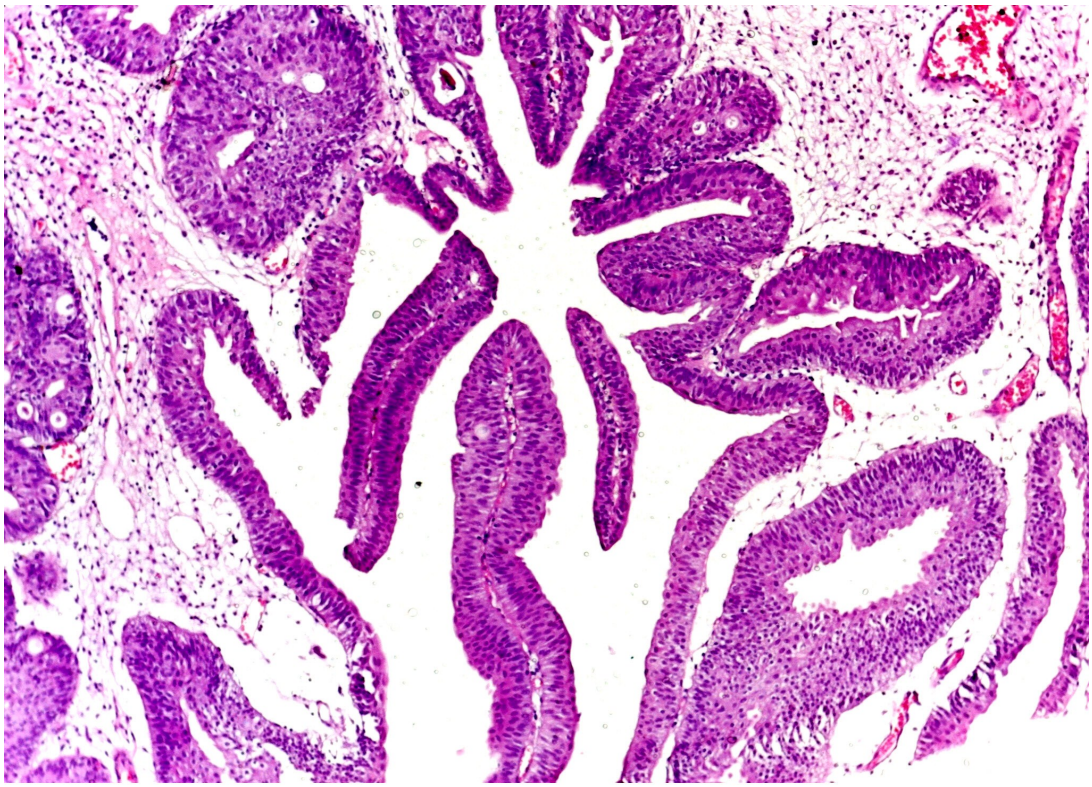
P 13-2 *Urinary bladder.* ***A.*** *Verrucous carcinoma, filamentous pattern,* marked keratinization and mild dysplasia with bulbous ends. ***B.*** *Squamous cell carcinoma,* invasive groups and cell nests with associated calcified Bilharzia egg.



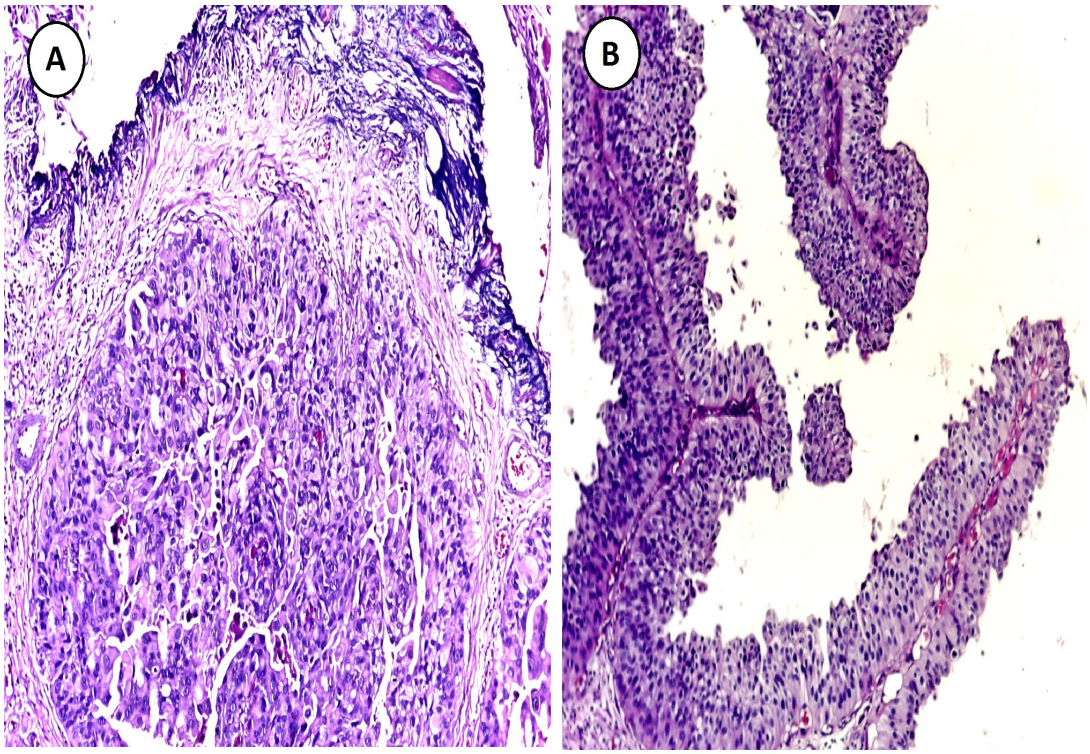
P 13-3 Skin. Basal cell nevus. A microscopic focus (2mm) of malformed basal cell proliferation. This is usually a syndromic precancerous lesion to basal cell carcinoma (Courtesy of PathologyOutlines.com)**.**



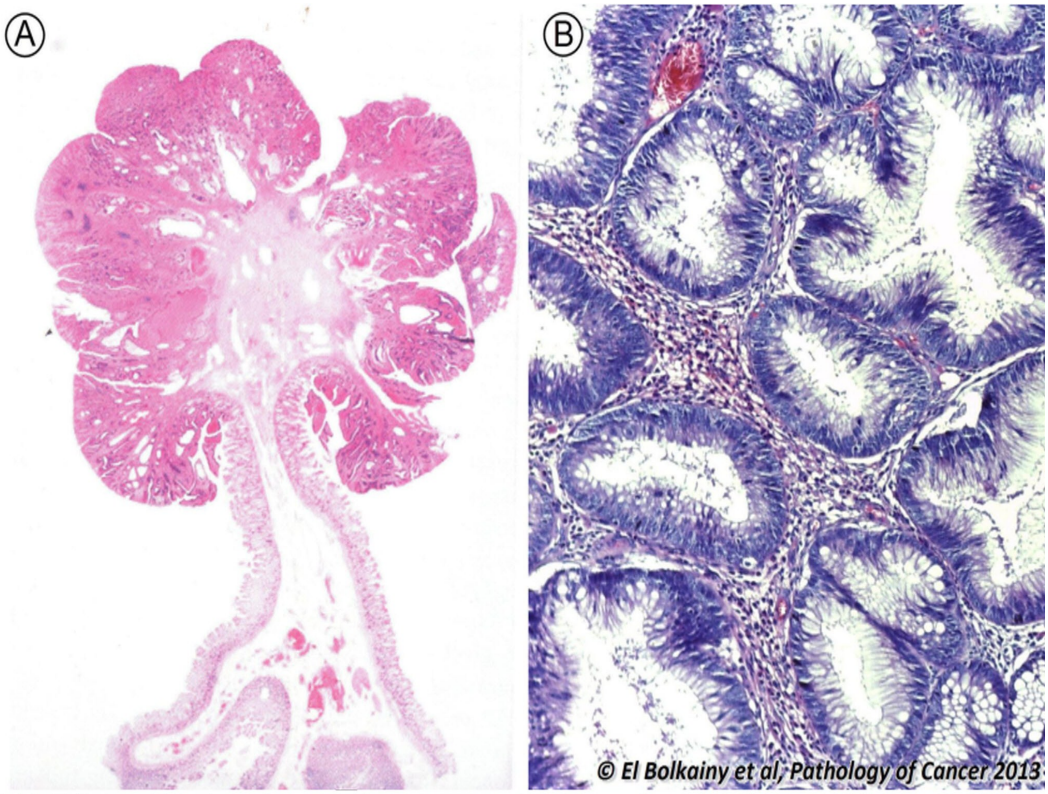
P 13-4 Skin. Basal cell carcinoma. **A** Gross: Ulcerated nodule with beaded rolled-in edge. **B** and **C** Histolog: Basaloid cells with peripheral palisading and retraction artifact from surrounding stroma.



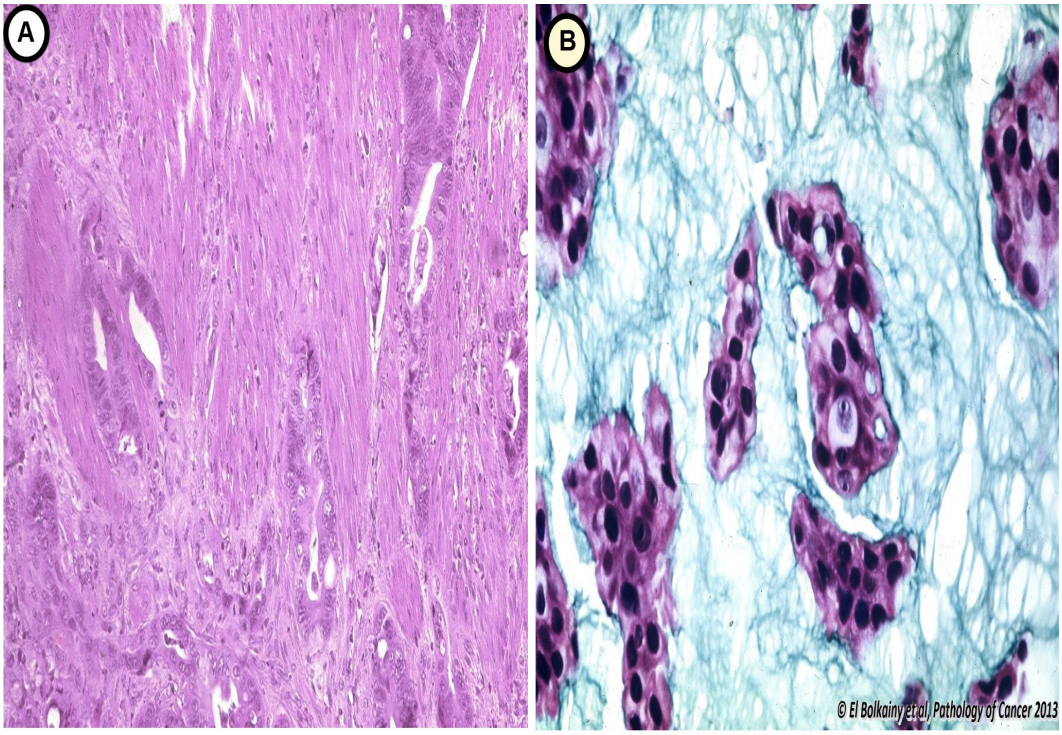
P 13-5 Urinary bladder, transitional cell papilloma. The epithelium covering the papillae is mature, only 6 layers cell thickness, preserved vertical polarity and fibrovascular core.



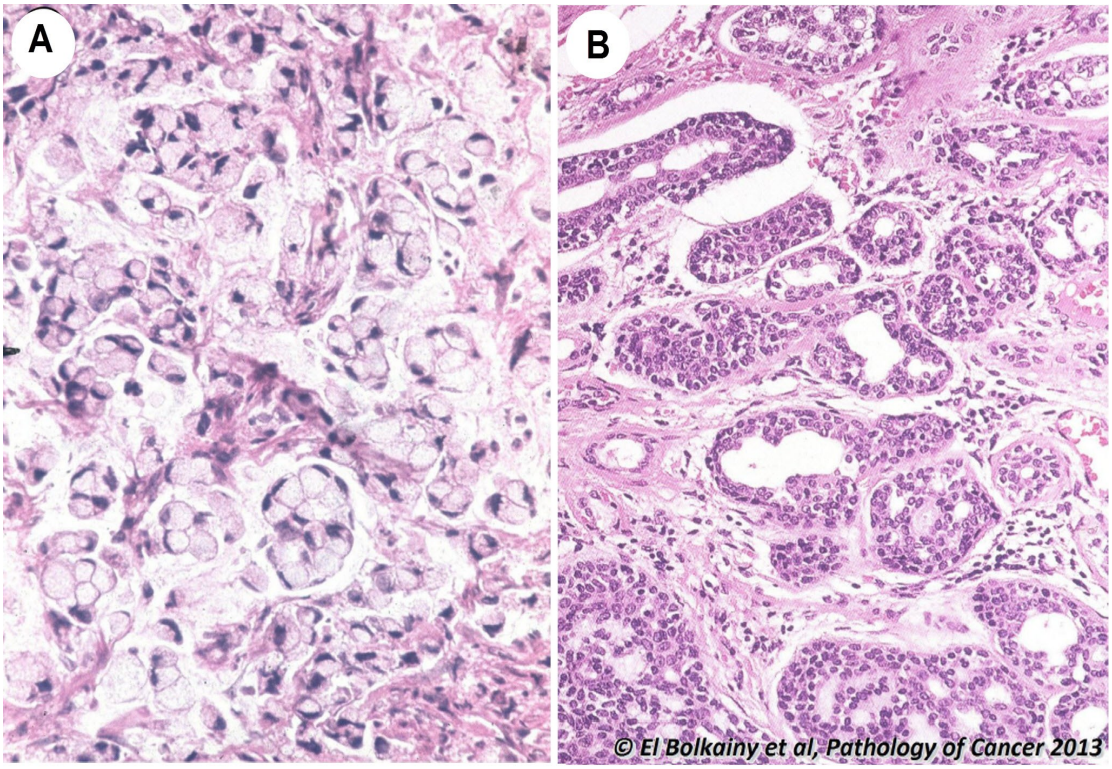
P 13-6 Urinary bladder, Urothelial (transitional) carcinoma. **A.** low grade papillary carcinoma showing vertical polarity, vascular core and more than 6 layers of eoithelium. **B.** High grade tumor with loss of polarity, marked pleomorphism and lack of vascular core.



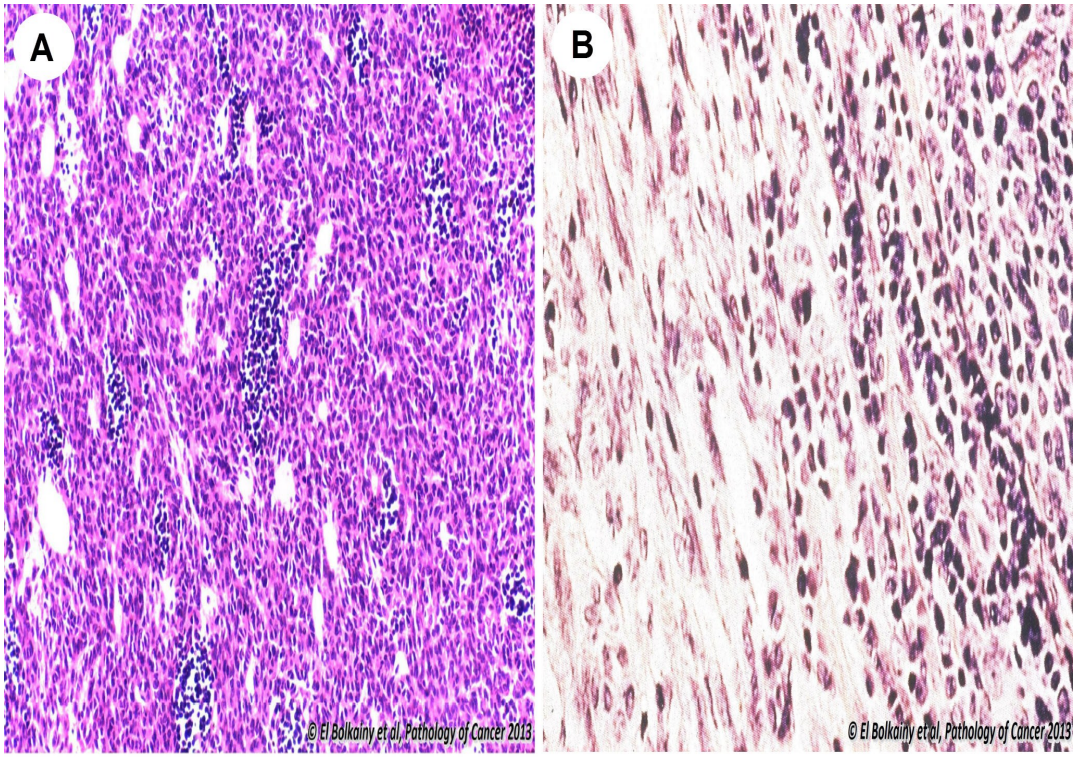
P 13-7 Colon, Tubular adenoma. **A.** low power showing pedunculated polypoid tumor. **B.** High power, epithelium with mild dysplasia in the form of stratified but basal nuclei.



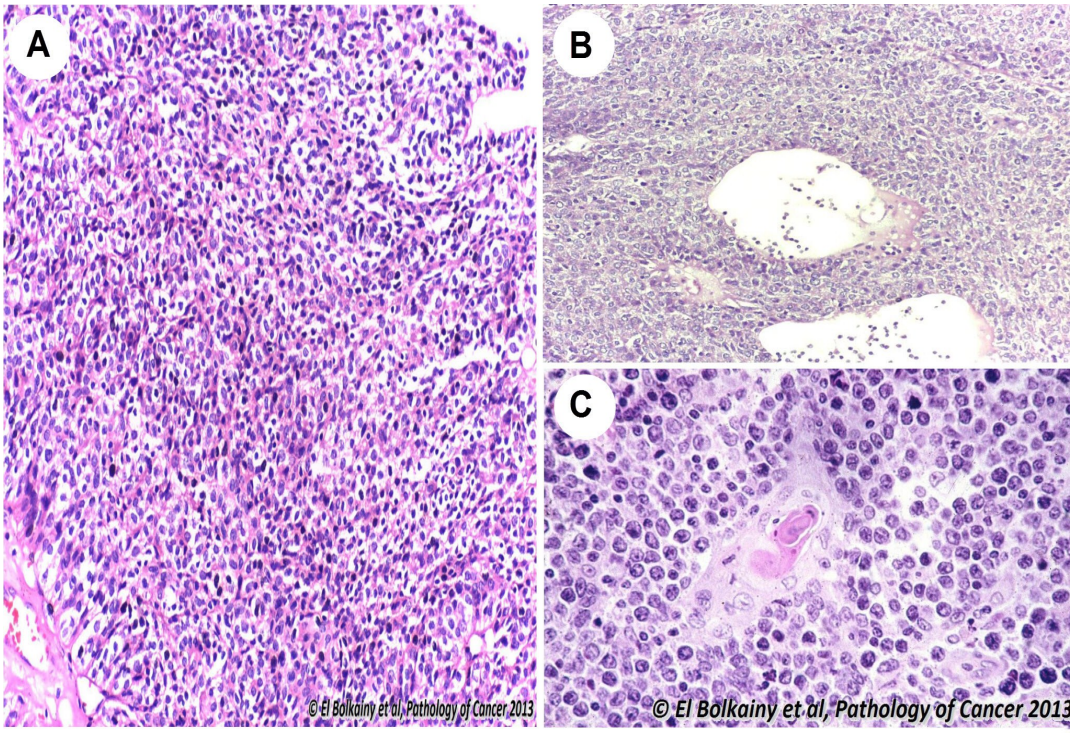
P 13-8 Colon. Adenocarcinoma. **A**. Gland forming adenocarcinoma, irregular glands infiltrating in desmoplastic stroma within colonic muscle layer. **B.** Mucinous carcinoma, pools of extracellular mucin (Alcian Blue positive) entangling floating groups of malignant epithelial cells (Molecular genetics: APC, MCC; 5q21-22).



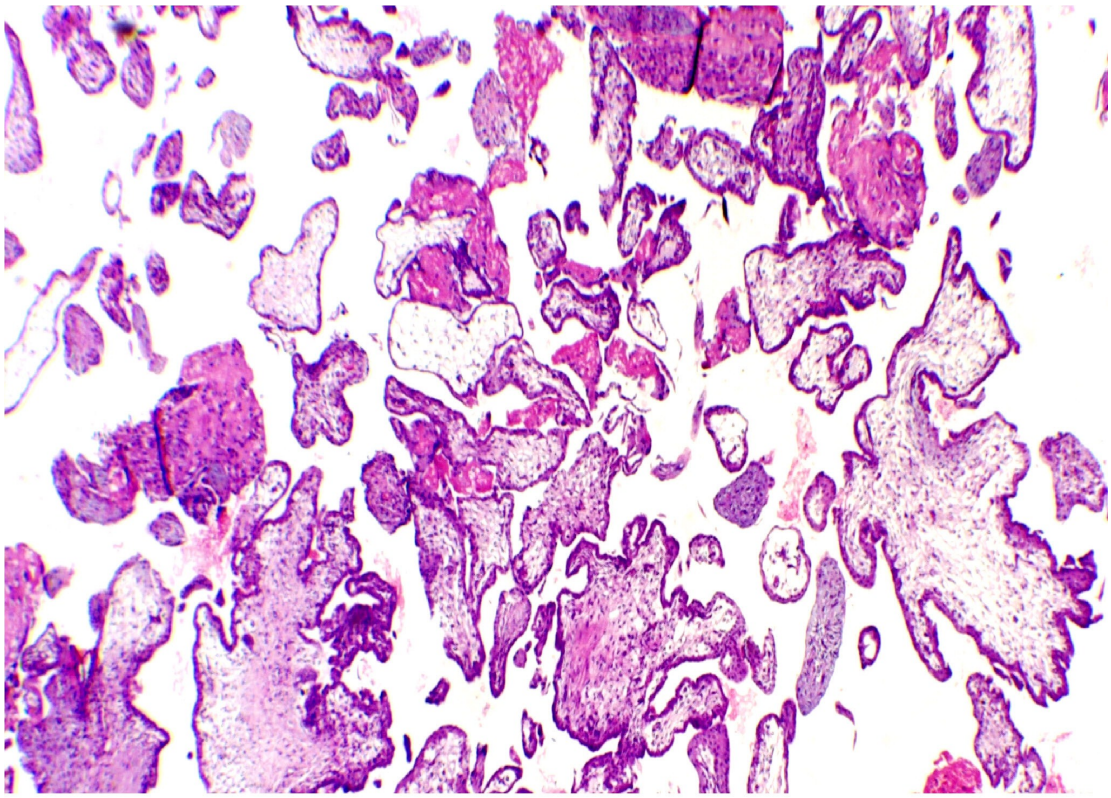
P 13-9. Adenocarcinoma. **A** Signet ring adenocarcinoma. Single intracytoplasmic mucin globule compressing the nucleus. **B** Adenoid cystic carcinoma of salivary gland. Cylindromatous histologic pattern is diagnostic, but may show tubular and solid patterns.



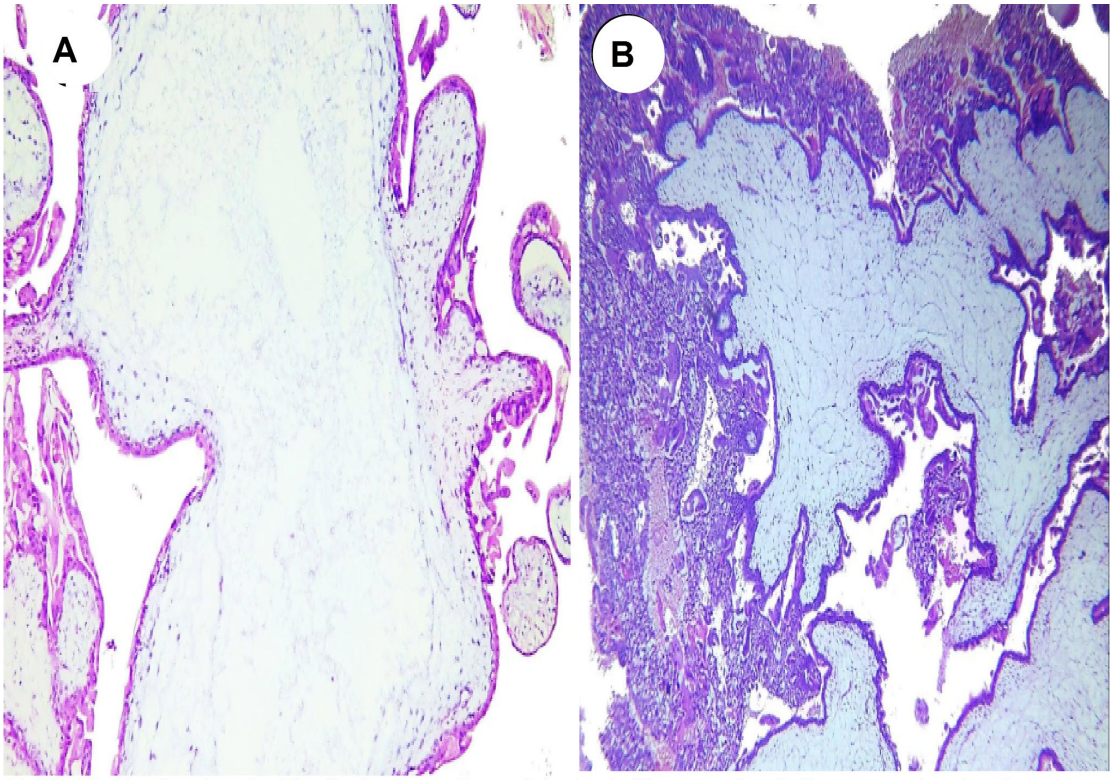
P 13-10. Thymoma. **A** Type A, spindle-shape thymic epithelium (CK19 +ve) associated with mature T-lymphocytes (CD3 +ve, TdT -ve). **B** Type AB thymoma, rounded and spindle thymic epithelium (CK5/14 +ve), and T-lymphocyte rich (CD3 +ve, TdT -ve).



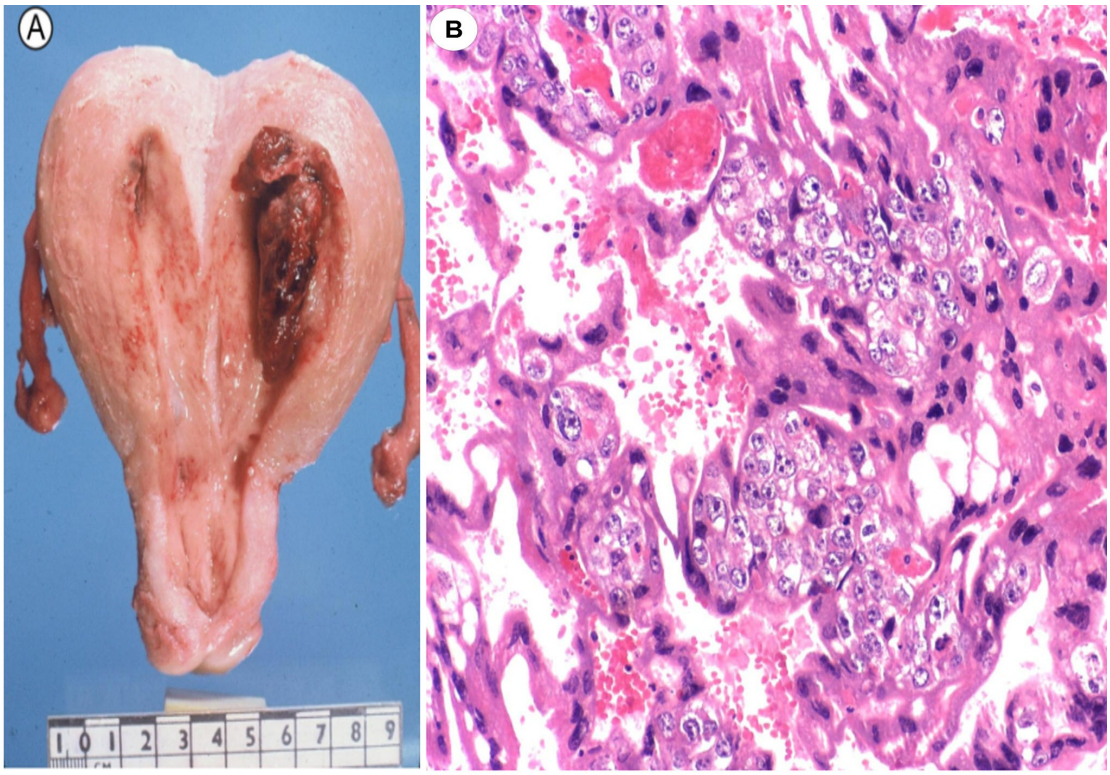
P13-11 Thymoma. A type B3, epithelium rich, polygonal cells with squamous differentiation (EMA, MUC1 +ve) may be confused with highly malignant thymic carcinoma formerly type C (the latter is confirmed by positivity for C-Kit, CD5 and PAX 8). **B** and **C** organotypic freature of thymoma: serum lakes and Husselle corpuscle.



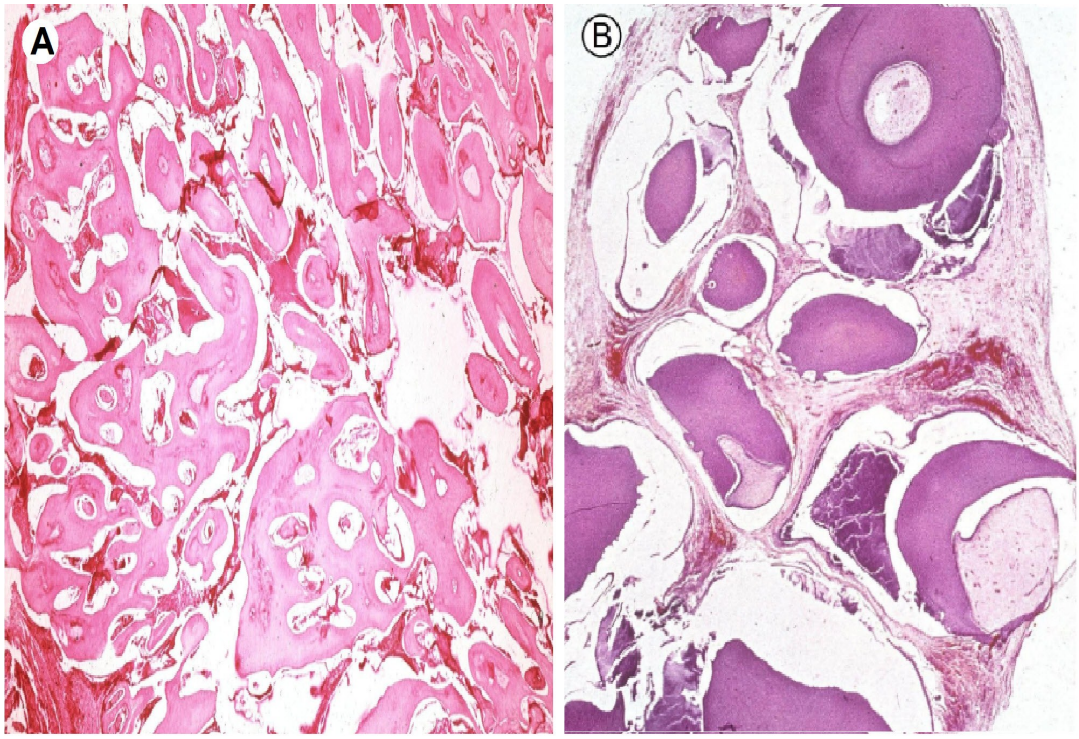
P 13-12. Benign trophoblastic tumors. Partial hydatidiform mole, Two populations of large and very small villi are observed, the former showing stromal cavitation.



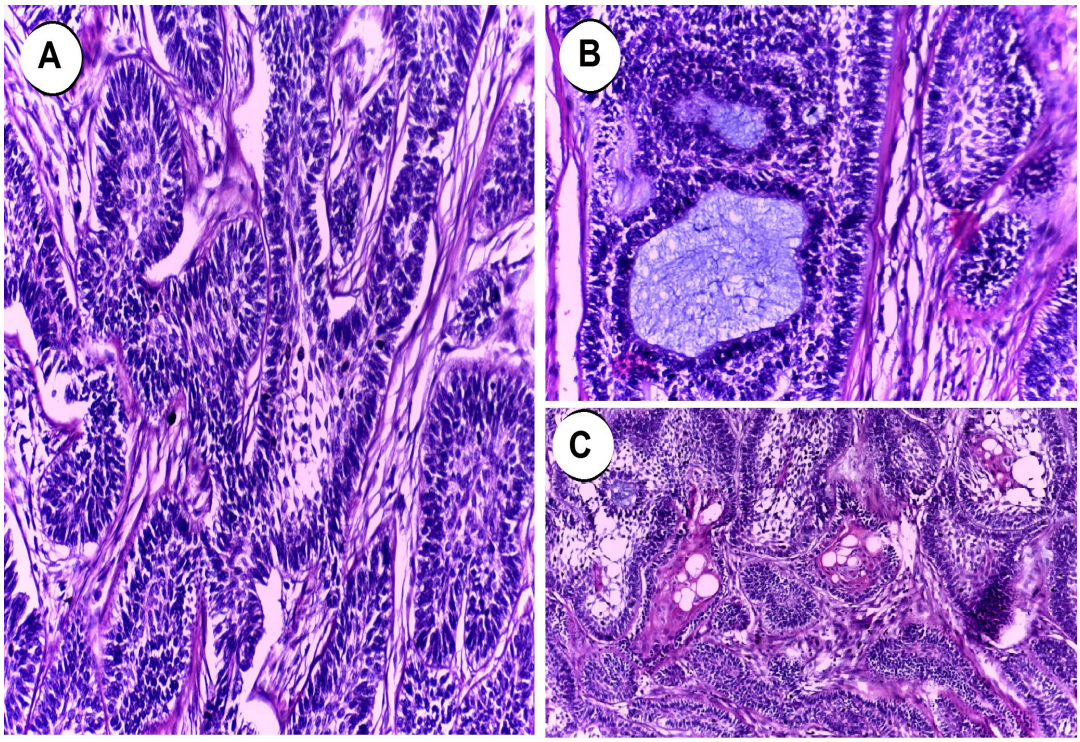
P 13-13. Benign trophoblastic tumors. Complete hydatiform mole. **A** Composed only of markedlly enlarged edemetous avascular villi. **B** associated with marked surface trophoblastic proliferation.



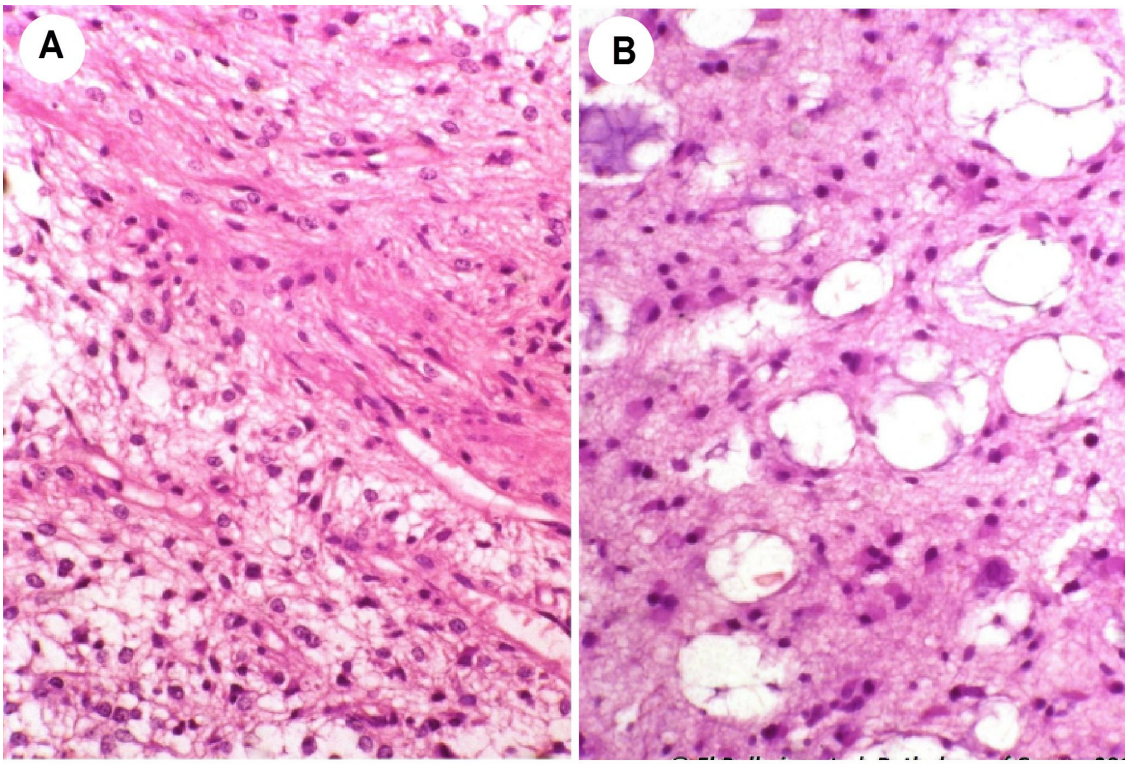
P 13 14 Malignant trophoblastic tumor, gestational choriocarcinoma, **A.** Gross, Hemorrhagic tumor mass in uterine corpus. **B.** Histology, demonstrates both syncitio- and cytotrophoblastic epithelia with absence of any villi.



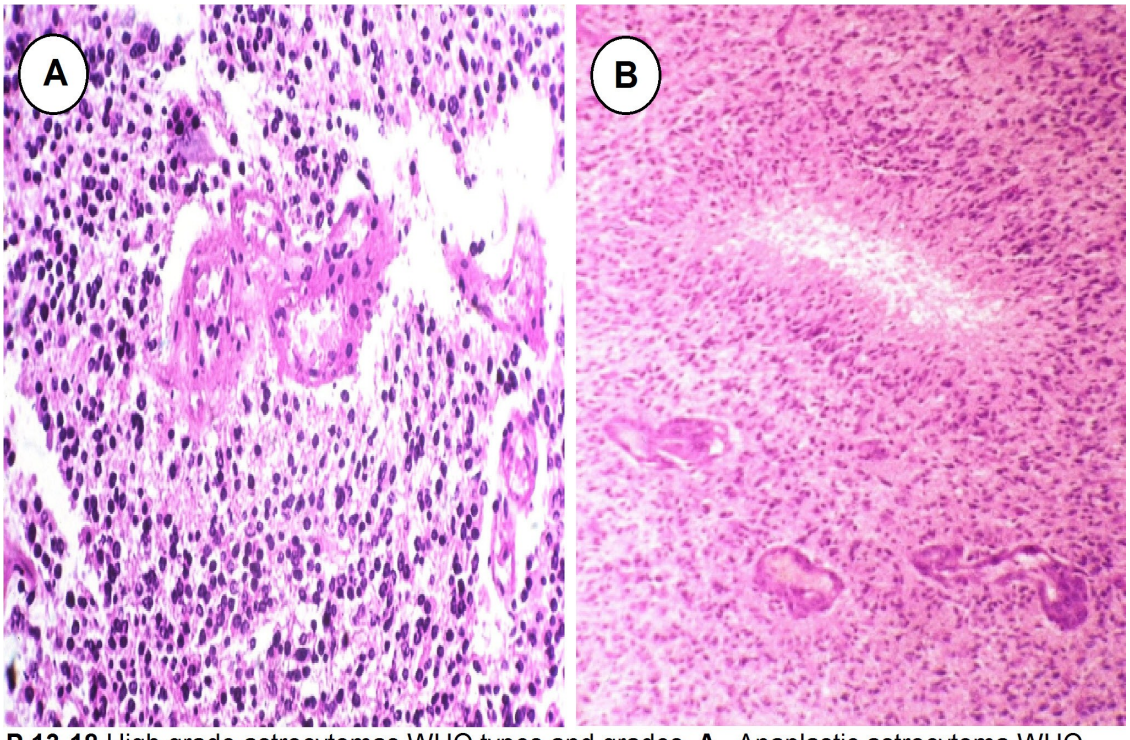
P 13-15 Benign odontogenic tumors. **A.** Complex odontoma, a malformation of enamel, dentin, cementum and pulp tissue. **B**. Compound odontoma showing multiple more developed but deformed teeth.



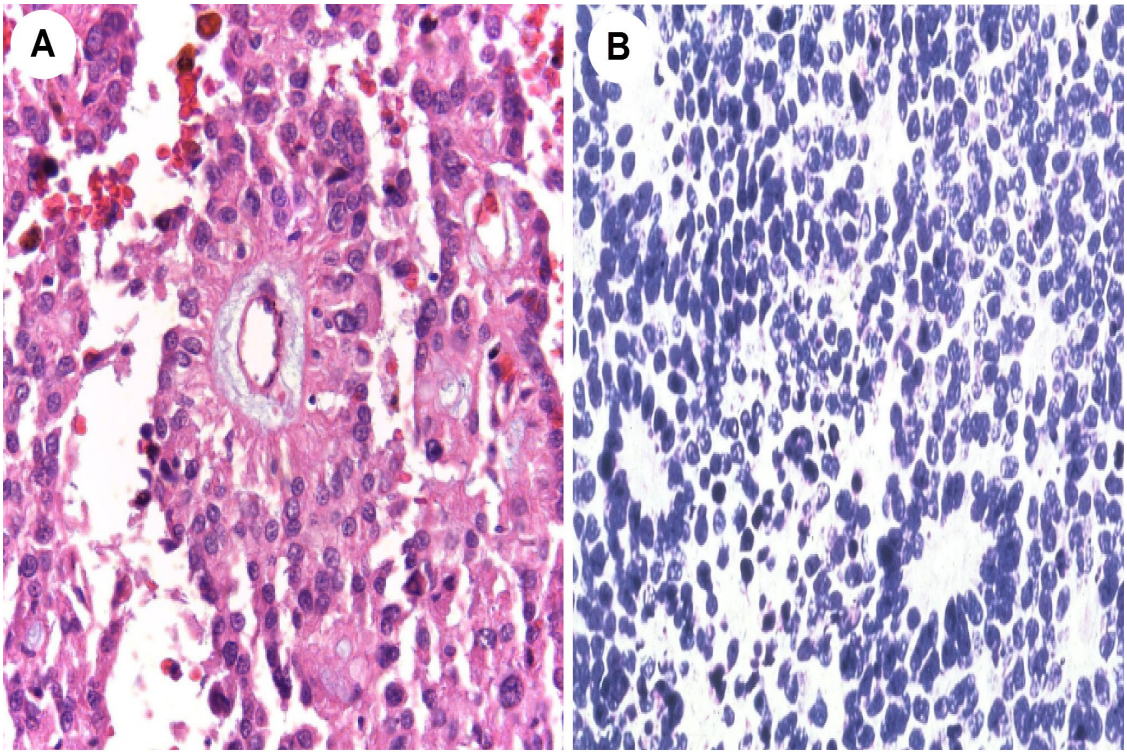
P 13-16. Odontogenic tumor, Ameloblastoma. **A** Conventional with central stellate reticulum and peripheral palisading of columnar cells. **B** Cystic variant. **C.** Ameloblastoma with squamous differentiation. This is a locally aggressive and recurrent tumor if excision is inadequate**.** A frankly malignant variant is also reported (ameloblastic carcinoma)



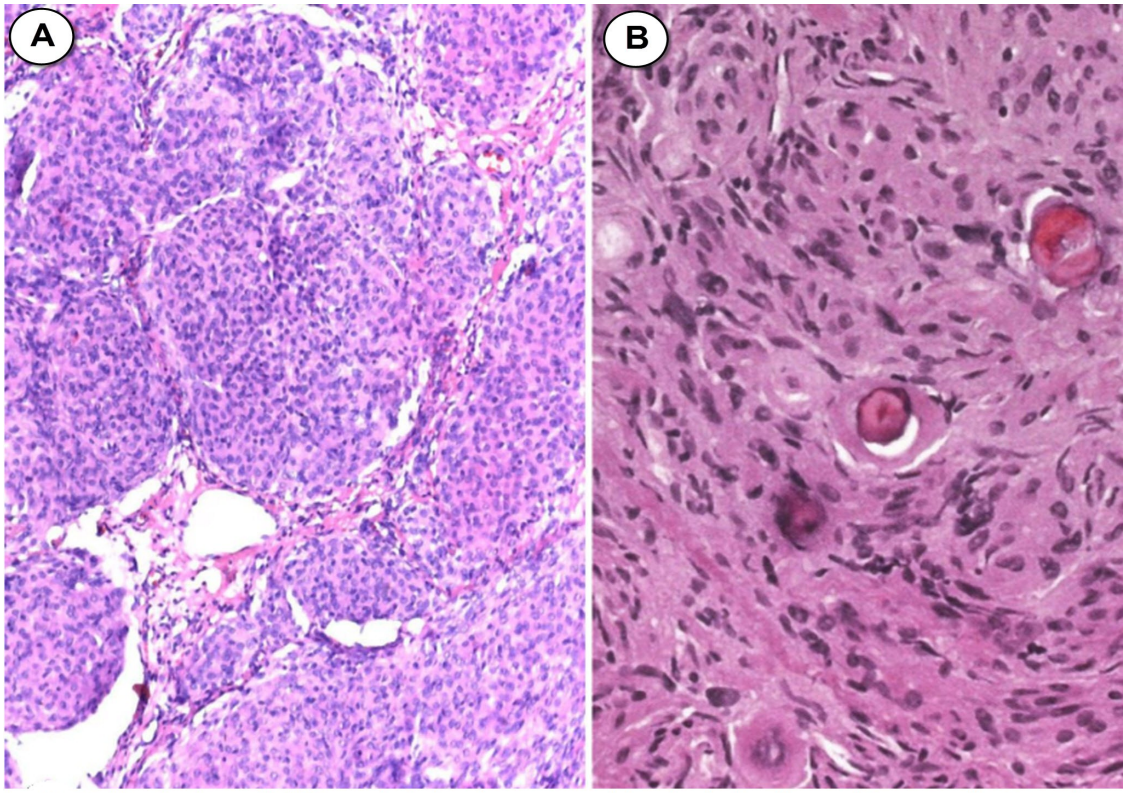
P 13-17. Low grade WHO astrocytomas types and grades **A** Pilocytic astrocytoma WHO grade I showing biphasic pattern of spindle and loose fibrillary areas. **B** Diffuse astrocytoma WHO grade II showing astrocyte proliferation, fibrillary stroma with microcystic changes.



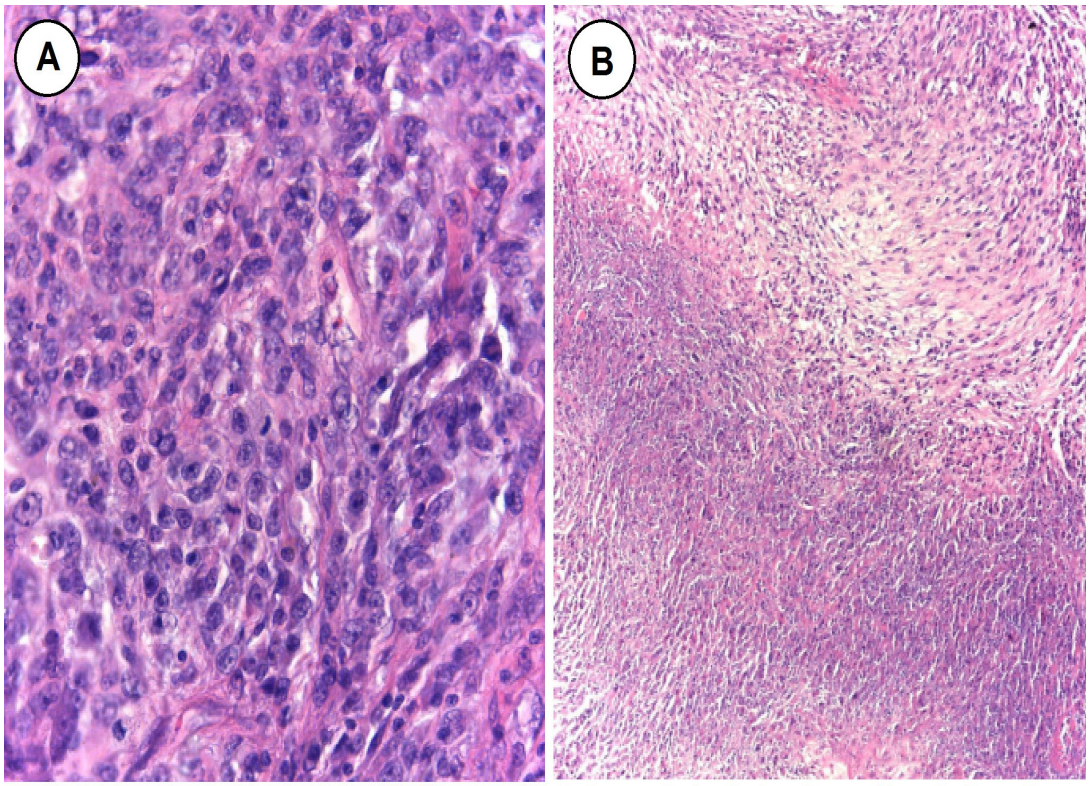
P 13-18 High grade astrocytomas WHO types and grades. **A.** Anaplastic astrocytoma WHO grade III, showing hypercellularity of astrocytes. **B.** Glioblastoma WHO grade IV showing palisading necrosis in the (upper field) and vascular proliferation with multilayering of endothelial cells (lower field)



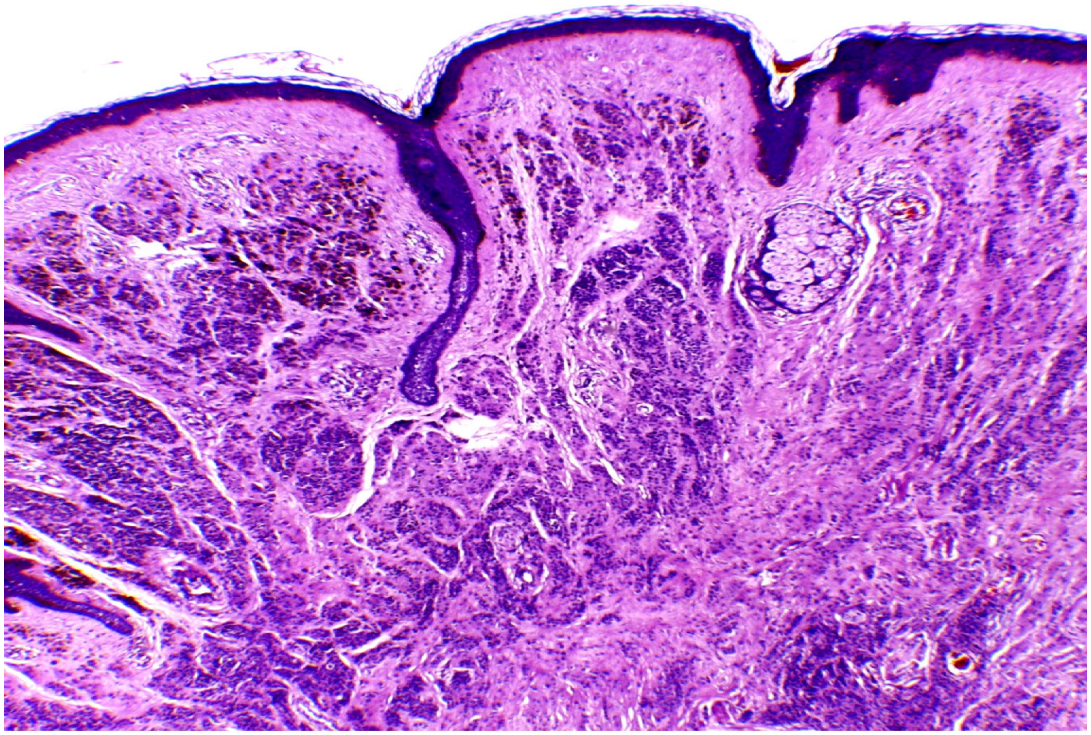
P 13-19. Ependymoma. **A** Low grade, showing diagnostic pseudorosettes with nuclei away from basement membrane (suprabasal location). **B** High grade, characterized by hypercellularity, stratified nuclei of vascular rosettes with basal location.



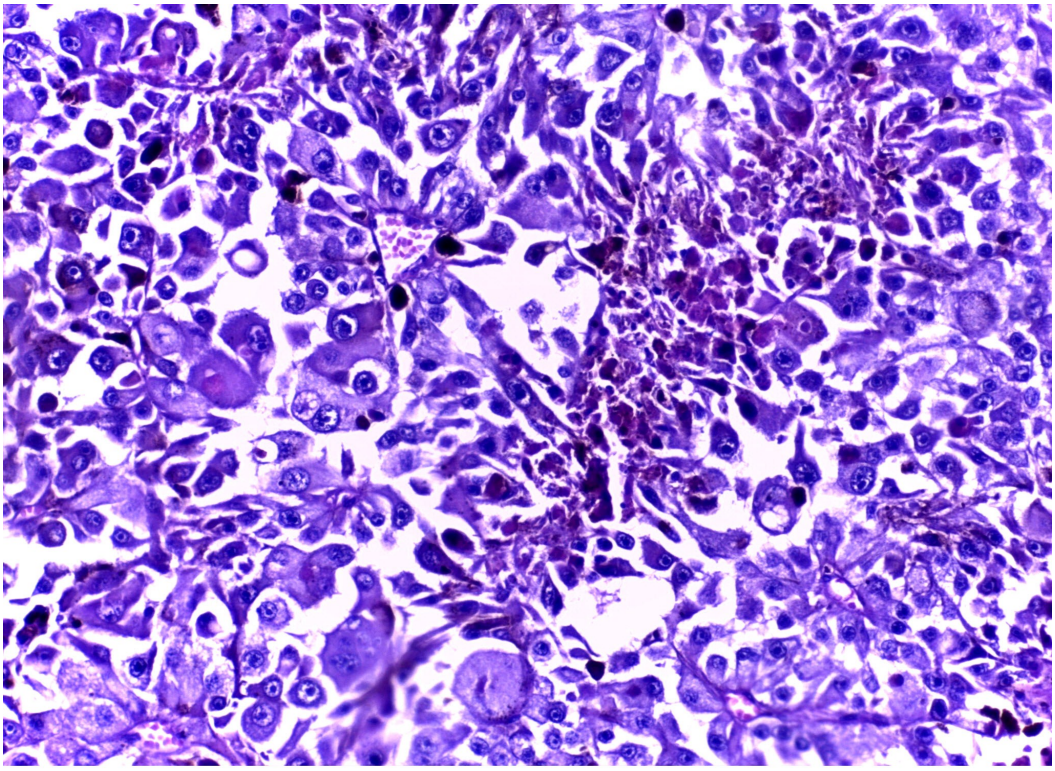
P 13-20 Meningioma WHO grade I showing concentric whorled pattern of tumor cells **A.** and microcalcification or psammoma bodies. **B.** This grade is associated with the lowest rate of recurrence 9%.



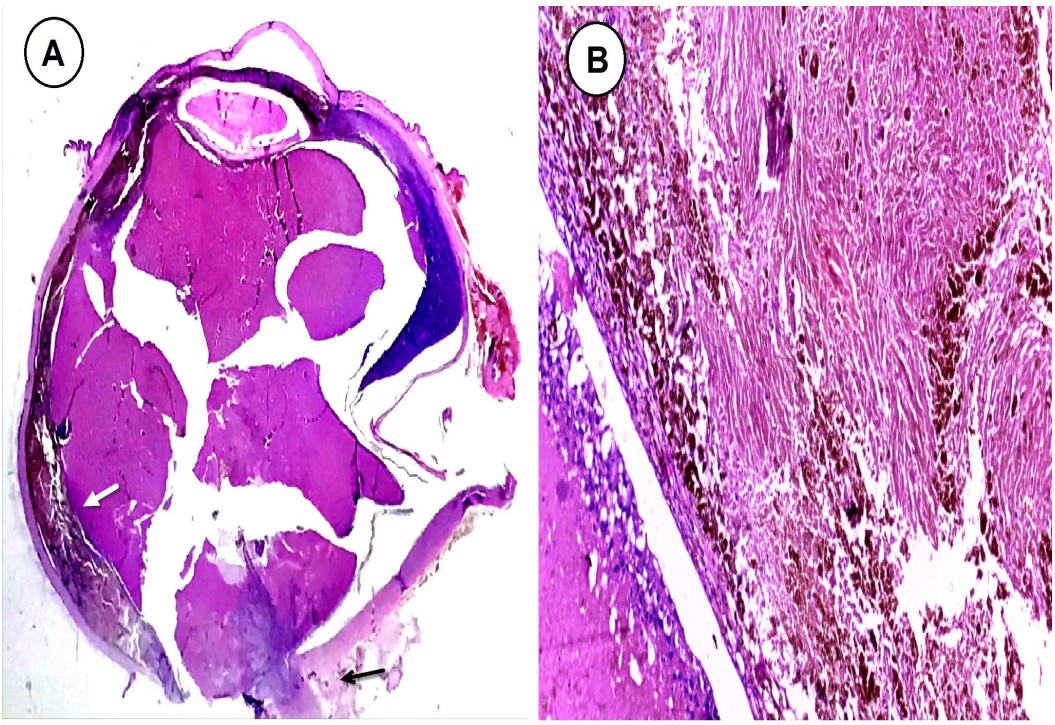
P 13-21 Anaplastic Meningioma WHO grade III, **A**. Loss of whorled pattern with spindle cell morphology, and active mitosis. **B.** Focal necrosis. Recurrence rate of such tumors is 40 %.



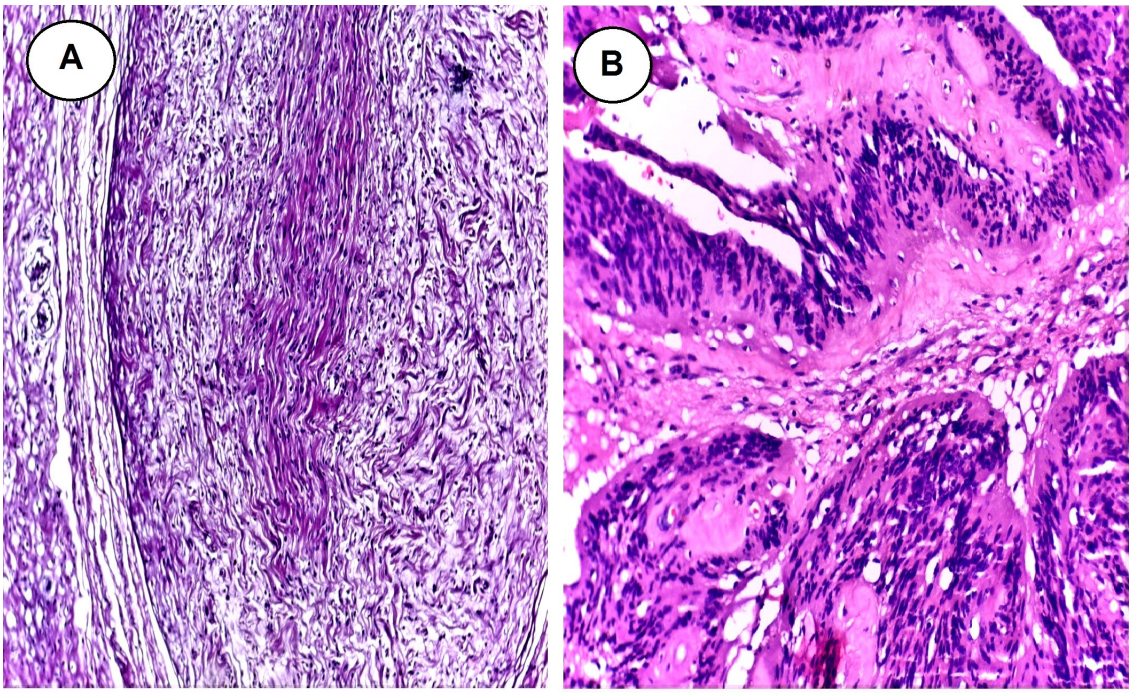
P 13-22 Skin, Pigmented intradermal nevus. Nests of melanocytes in the dermis maturing into spindle cells in the deep parts off the tumor.



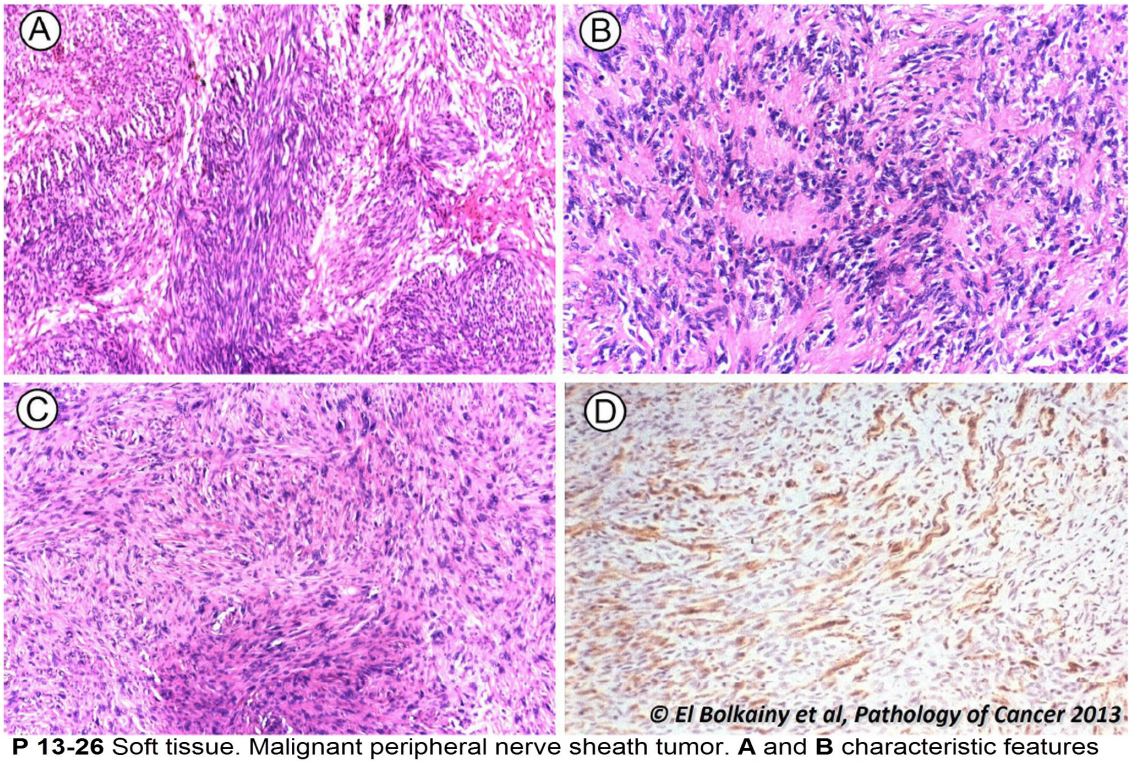
P 13-23. Pigmented malignant cutaneous melanoma. A dyscohesive pleomorphic cell population including spindle, epithelioid, plasmacytoid and multinucleated giant cells. Melanin pigment is evident in tumor cells. Diagnosis is confirmed by +ve S-100, Melan-A and HMB45.



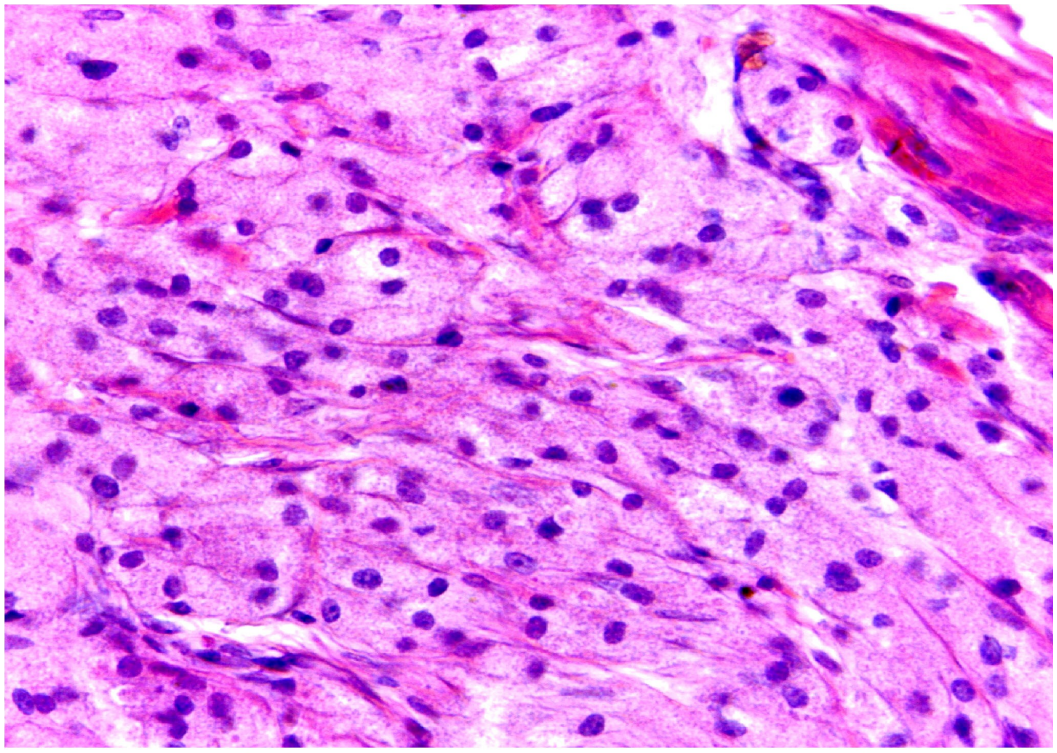
P 13-24 Occular melanoma. **A** Whole globe section showing a choroidal melanoma at posterior chamber of the eye (white arrow).The optic nerve (black arrow) is not infiltrated
B. High power showing the mixture of epithelioid and spindle cells with melanin pigment and retinal detachment.



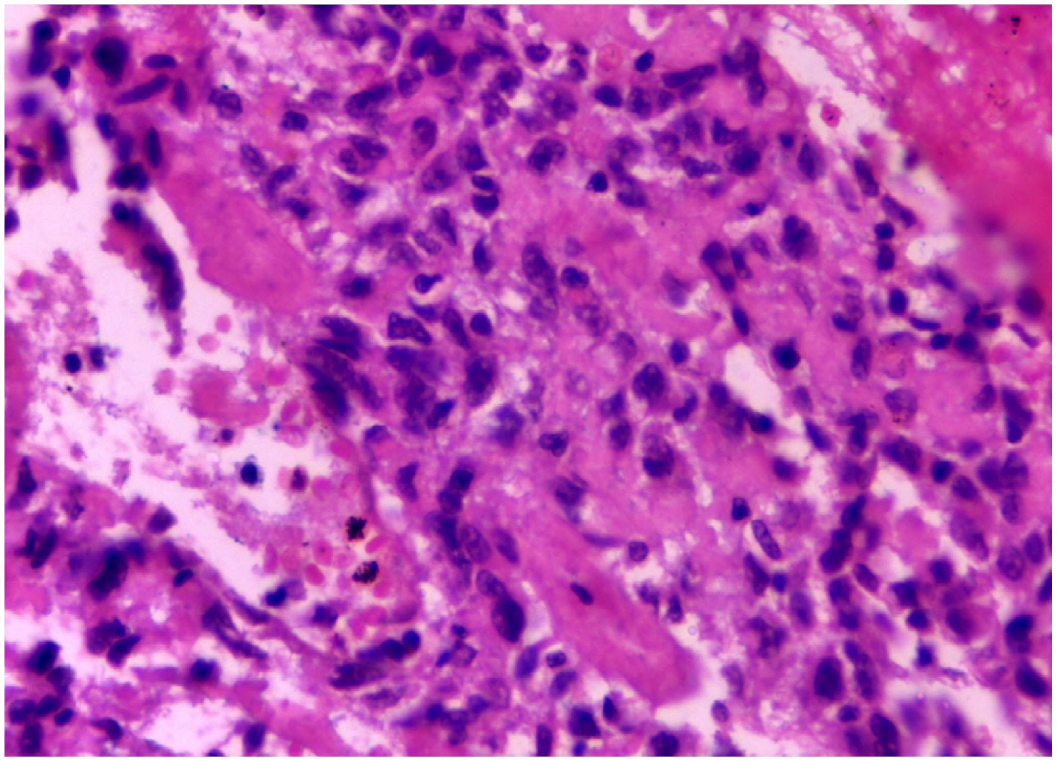
P 13-25 Benign nerve sheath tumors. **A** Neuroffibroma showing proliferating neurolemmal cells in bundles with wavy pattern, phenotype confirmed by immunophenotyping. **B** Neurilemmoma with prominant palisade pattern and Varcoy bodeis. Ki-67 in such tumors is usually low <5%.



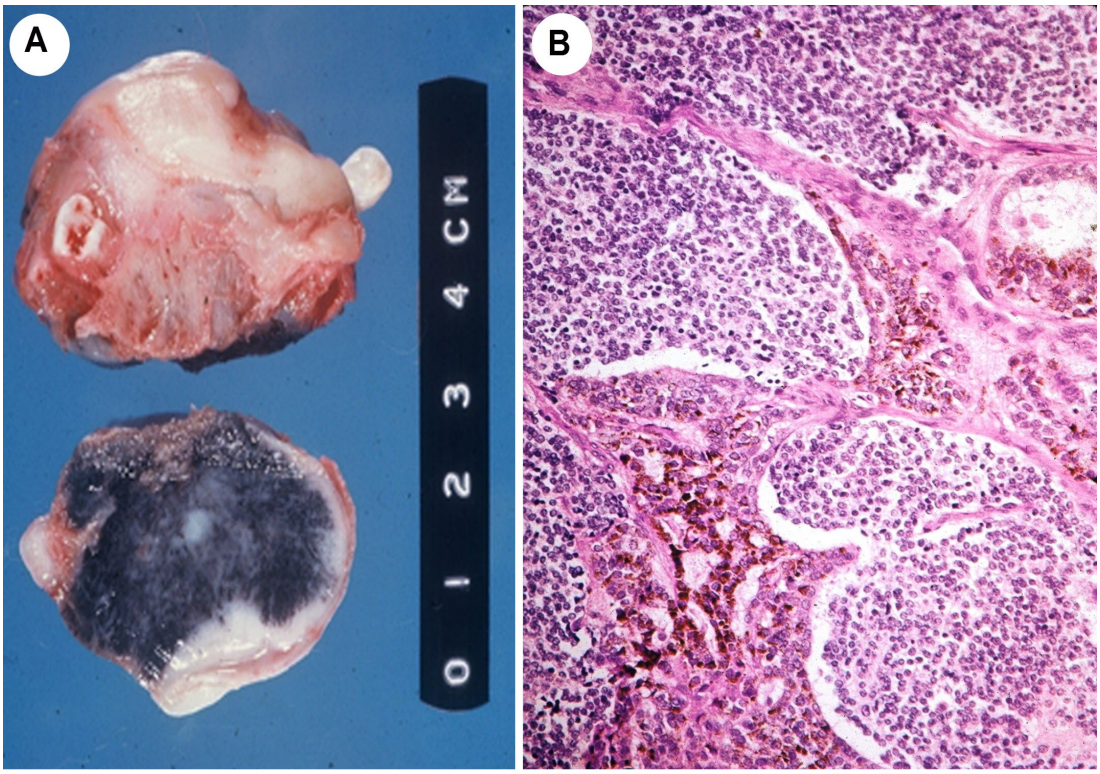
P 13-26 Soft tissue. Malignant peripheral nerve sheath tumor. **A** and **B** characteristic features are marked nuclear hyperchromasia and areas of hypercellularity alternating with others of hypocellularity (marble-like appearance) and mitotic activity. **C**. The bundles are patternless but rarely may show palisading or whorled pattern. **D**. Immunoreactivity for S-100 is confirmatory. Ki-67 is usually high (20%-40%).



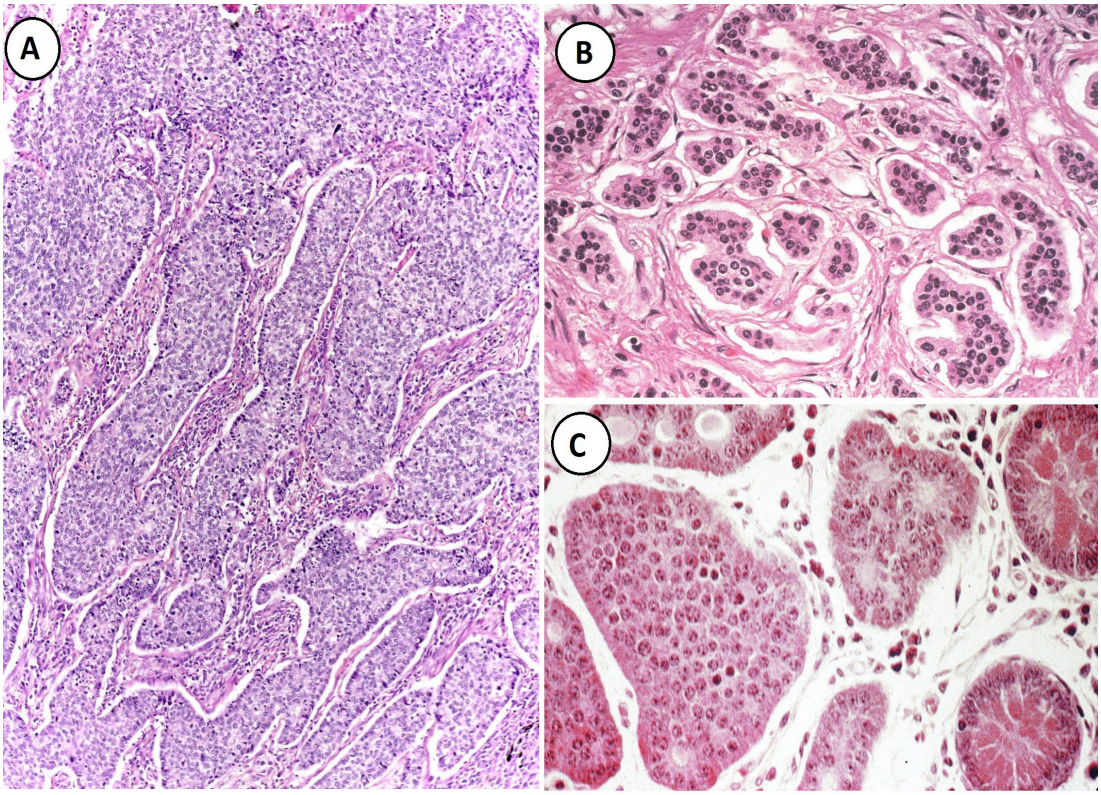
P 13-27. Soft tissue, benign granular cell tumor. The tumor shows rounded cells with abundant granular cytoplasm & small uniform central nuclei. The tumor is immunoreactive for S100. The tumor may be associated with atypical hyperplastic changes in surface squamous epithelium may be misdiagnosed as malignancy (Chapter 19).



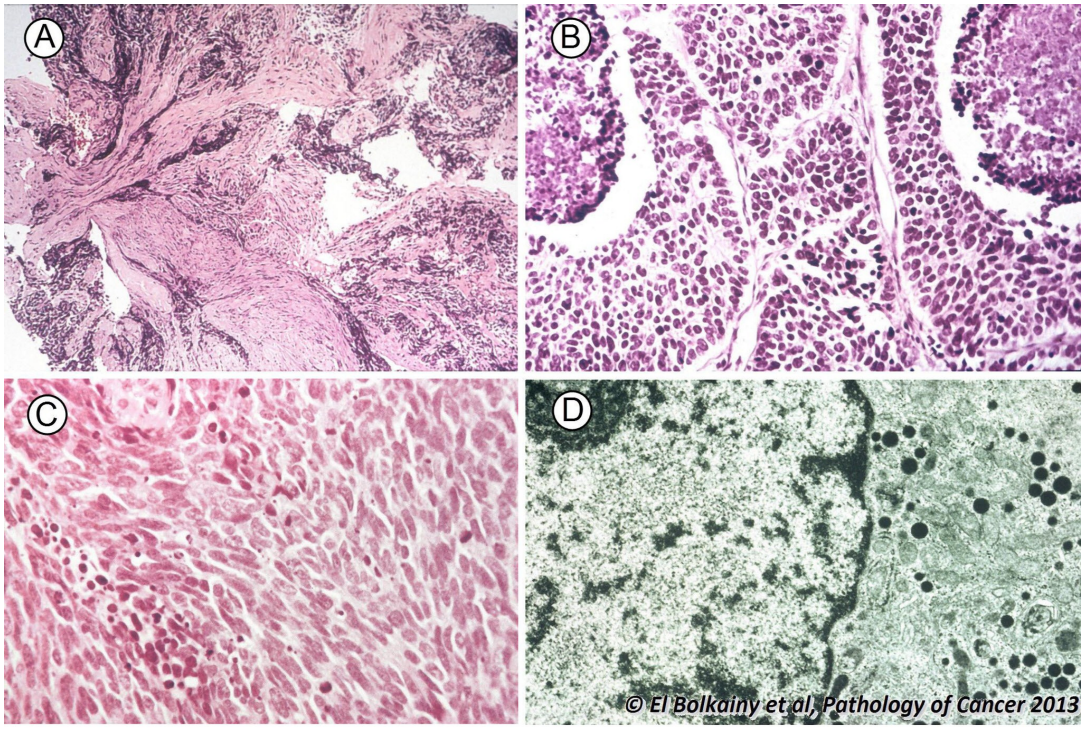
P 13-28 Soft tissue, Malignant granular cell tumor, characterized by bulky size, local spread and nodal metastases, hypercellularity, anaplasia and mitosis. Tumor cells are positive for S-100.



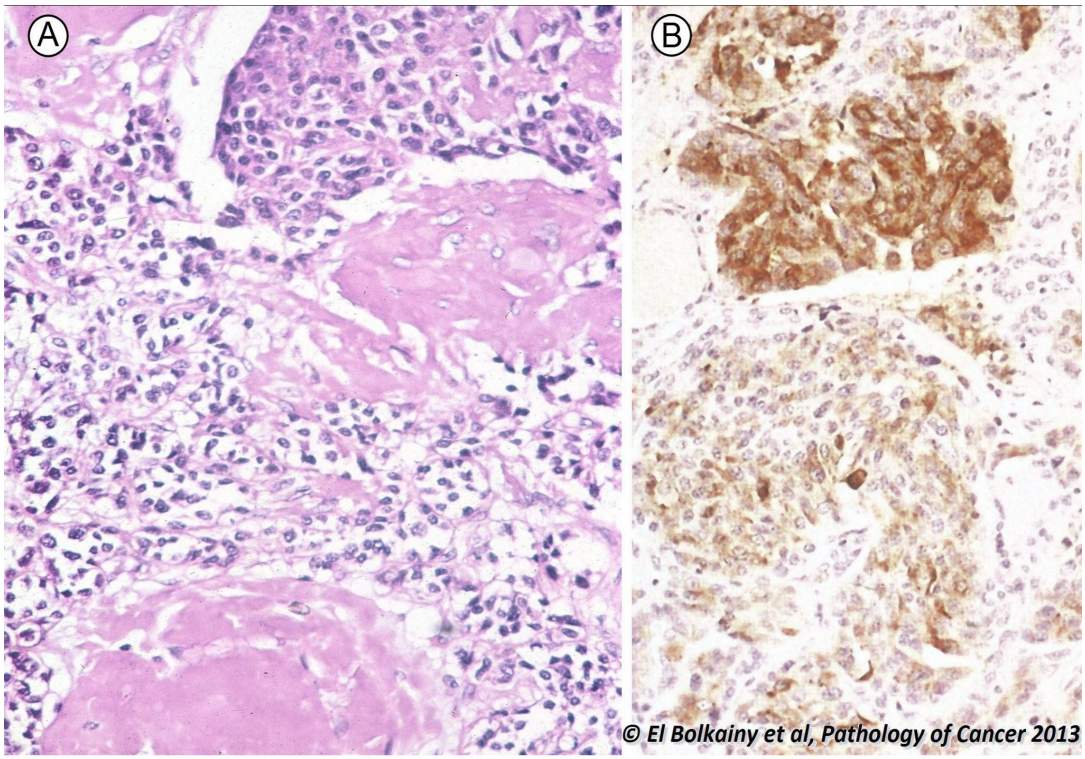
P 13-29. Pigmented neuroectodermal tumor of infancy (PNETI). **A** Maxillectomy specimen showing black color of the tumor. **B** Tumor shows dual population of small primitive and large pigmented cells. Biology is uncertain (56% benign, 37 % recurrent, 7% metastasizing).



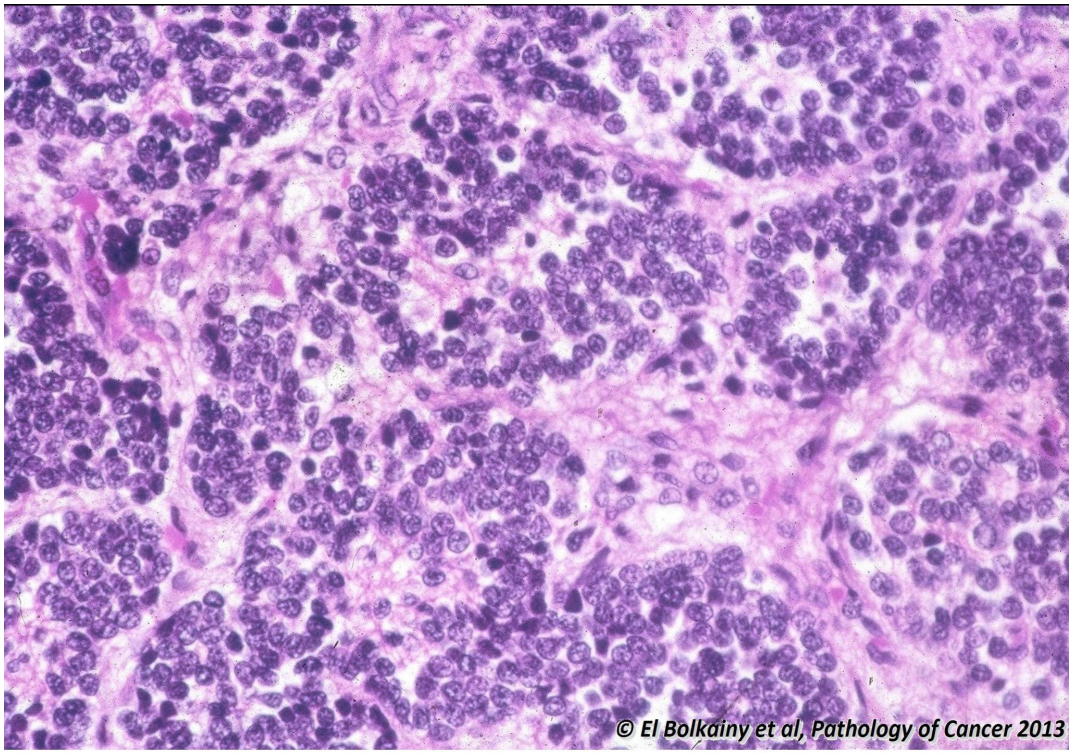
P 13-30. Carcinoid tumor, various histologic patterns. **A** Trabecular pattern. **B** Insular and tubular pattern. **C** Cribriform (pseudoglandular) pattern. Note the small relatively uniform cells and fibrotic stroma (desmoplasia). Immunoreactivity: Chromogranin +ve, Ki-67 < 5% in low grade carcinoid, 5-20 % in atypical carcinoid.



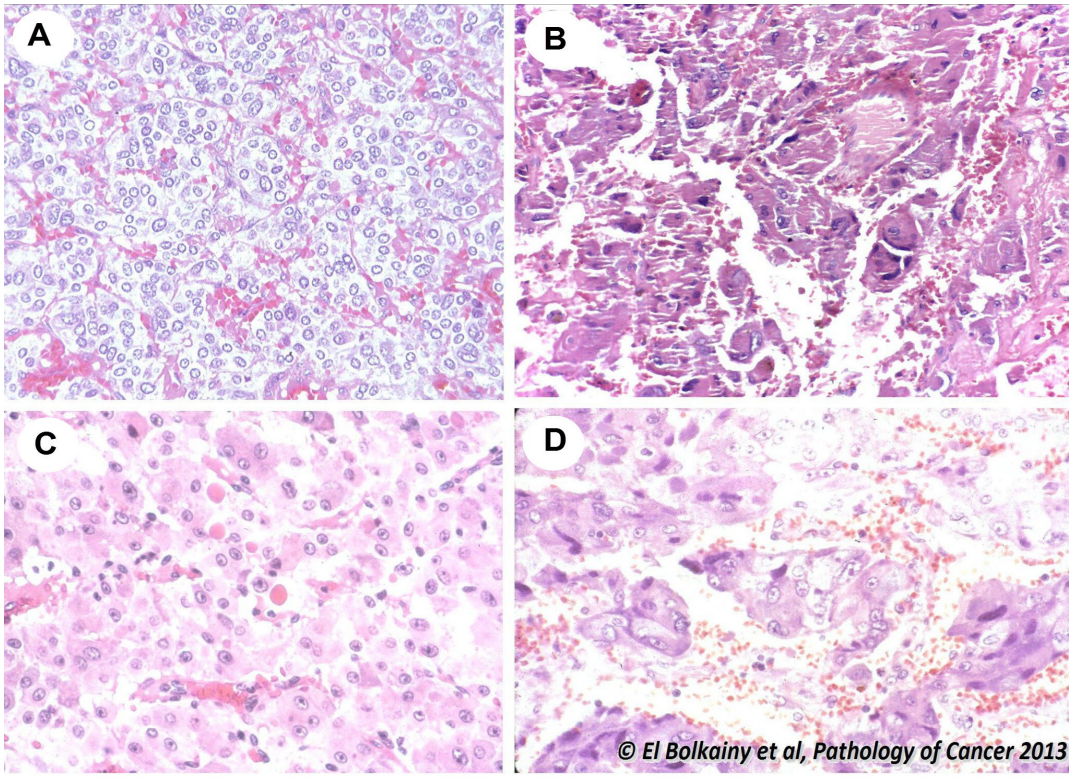
P 13-31 Lung. Small cell carcinoma. **A, B** and **C** characterized by small rounded or oval cells (<3 lymphocytes in diameter), moulding, smudging of nuclei, scanty cytoplasm and active mitosis (60/10HPF). Immunoreaction to chromogranin and TTf-1, Ki-67 is > 50%. **D**. Electron microscopy showing membrane -bound neurosecretory granules characteristic of tumors of neuroendocrine origin. (Molecular genetics: FHIT; 3p14.2).



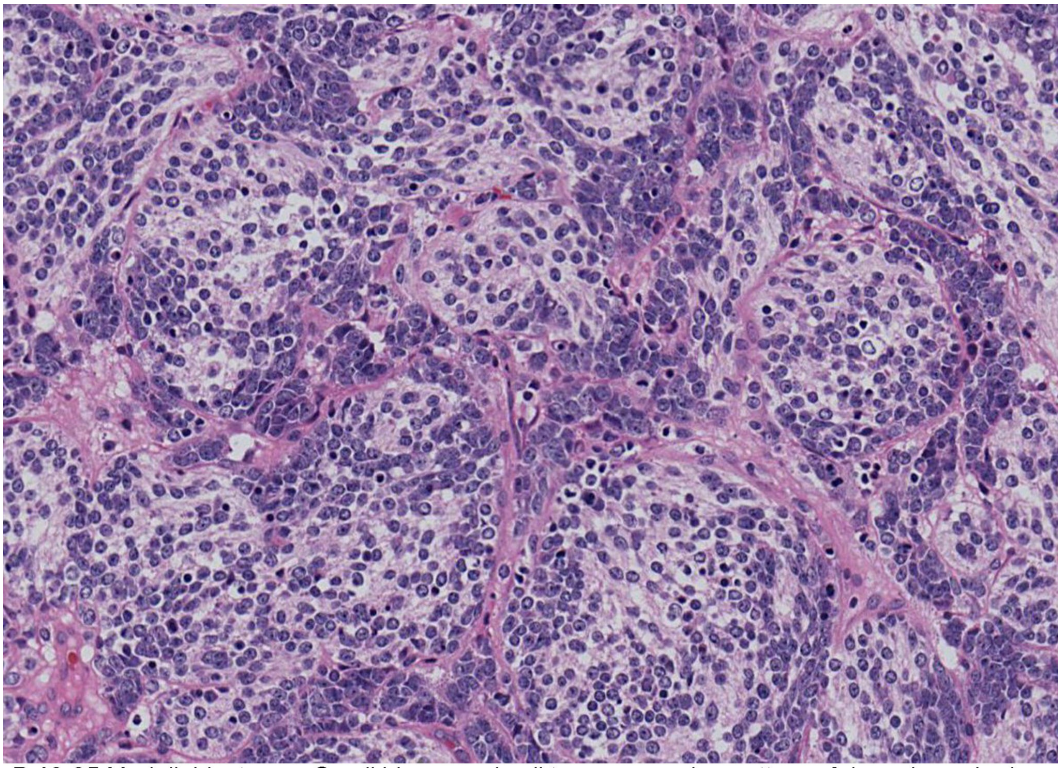
P 13-32 Thyroid gland. Medullary carcinom. **A**. solid groups of round oval, spindle or plasmacytoid (neuroendocrine c-cell in origin (confirmed by chromogranin and calcitonin) in fibrous stroma. **B.** Amyloid is evident in stroma in 80% of cases. (Molecular genetics: RET protonogene mutation; 10q11.2).



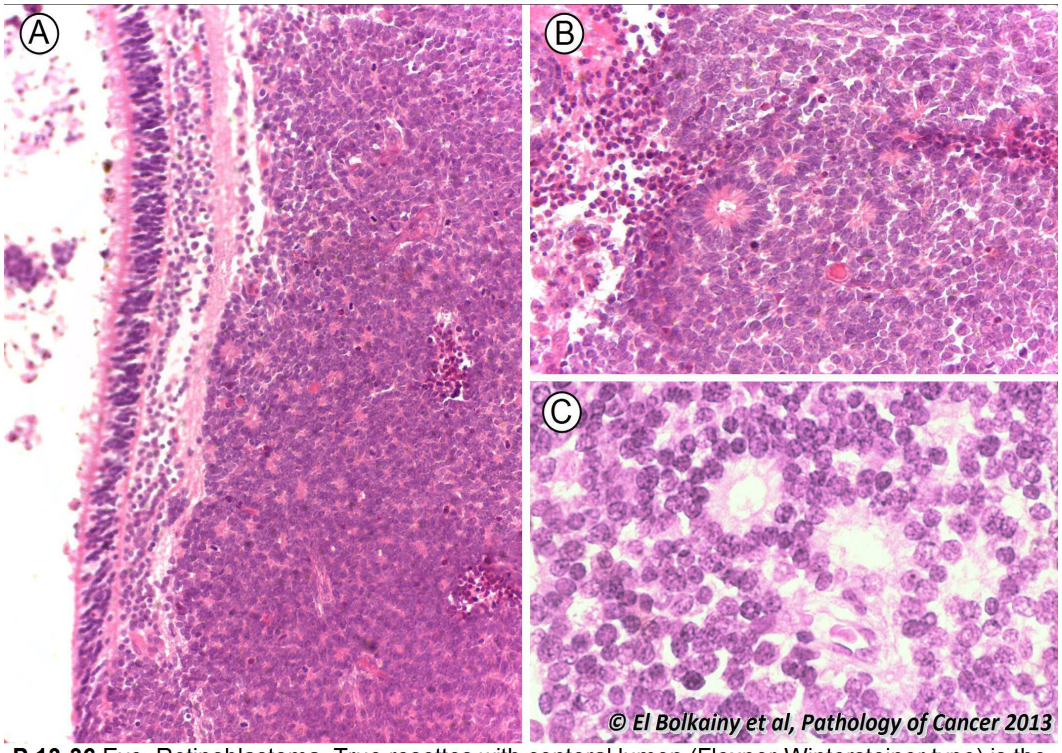
P 13-33 Neuroblastoma. Groups of neuroblasts with pseudorosette pattern (Homer-Wright), surrounded by neuropil stroma (thin neurotic processes). immunoreactivty: positive for synaptophysin, but negative for desmin and CD99. (Molecular genetics: N-MYC amplification, 2p24).



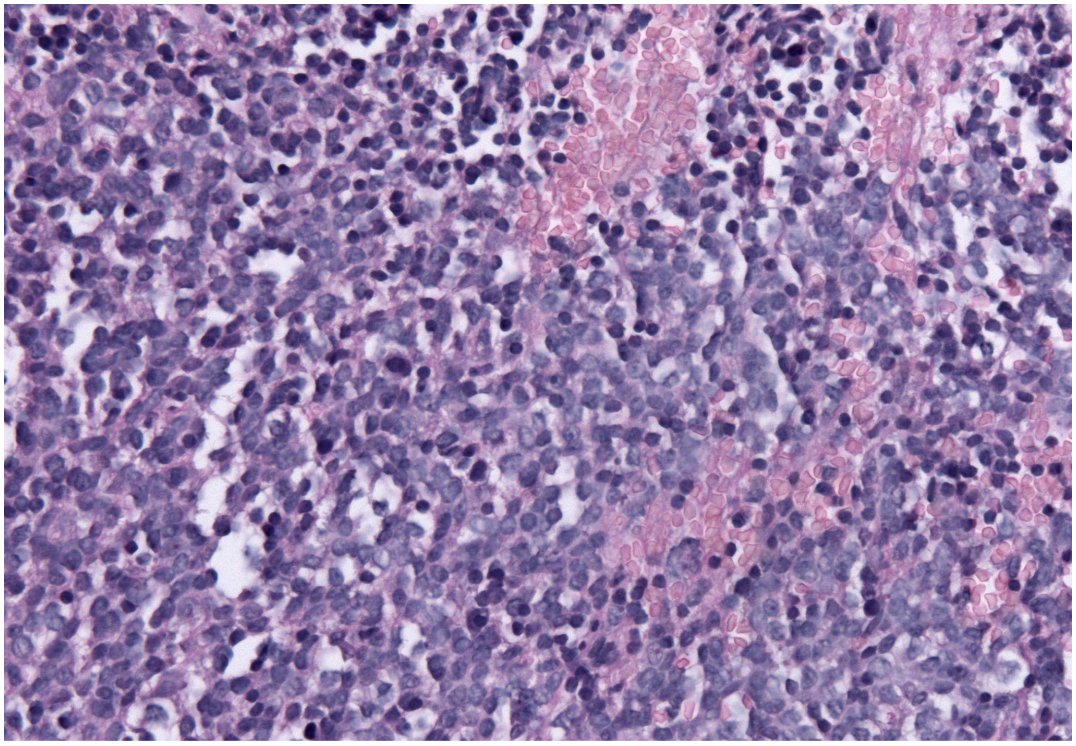
P 13-34. Pheochromocytoma. **A** Nested pattern (Zelballen) in fibrovascular stroma. **B** Symplastic changes. **C** Hyaline (PAS+) globules in cytoplasm. **D** Cytoplasmic basophilia (bluish color). Tumor cells are positive for chromogranin.



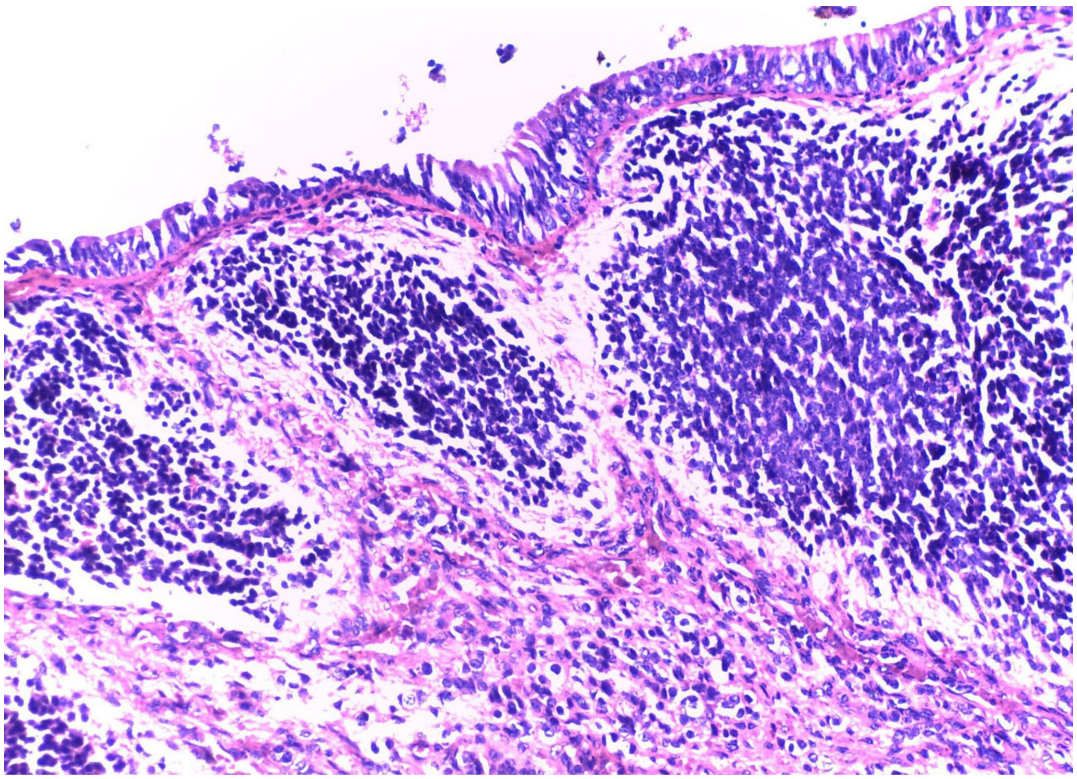
P 13-35 Medulloblastoma. Small blue round cell tumor, grouping pattern of densely packed undifferentiated cells (embryonal cells), with mitosis, apoptotic bodies and Homer Wright rosettes. Tumor cells are positive for synaptophysin. (Molecular genetics: HICI, REN; 17q). (Courtesy of PathologyOutlines.com)



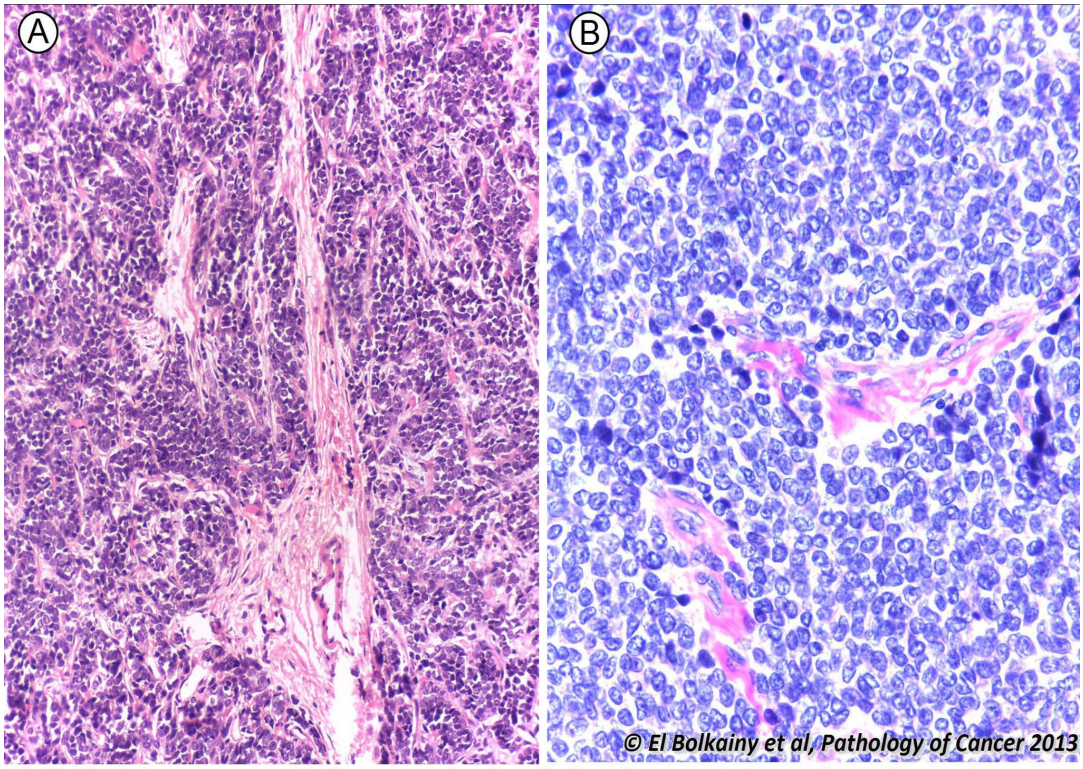
P 13-36 Eye. Retinoblastoma. True rosettes with centeral lumen (Flexner-Wintersteiner type) is the most common and diagnostic of retinoblastoma. **A**, **B** and **C** Grading, tumors with neumerous rodettes are considered well differentiated, poorly differentiated tumors lack rosettes and show focal necrosis. (Molecular genetics: RB; 13q14).



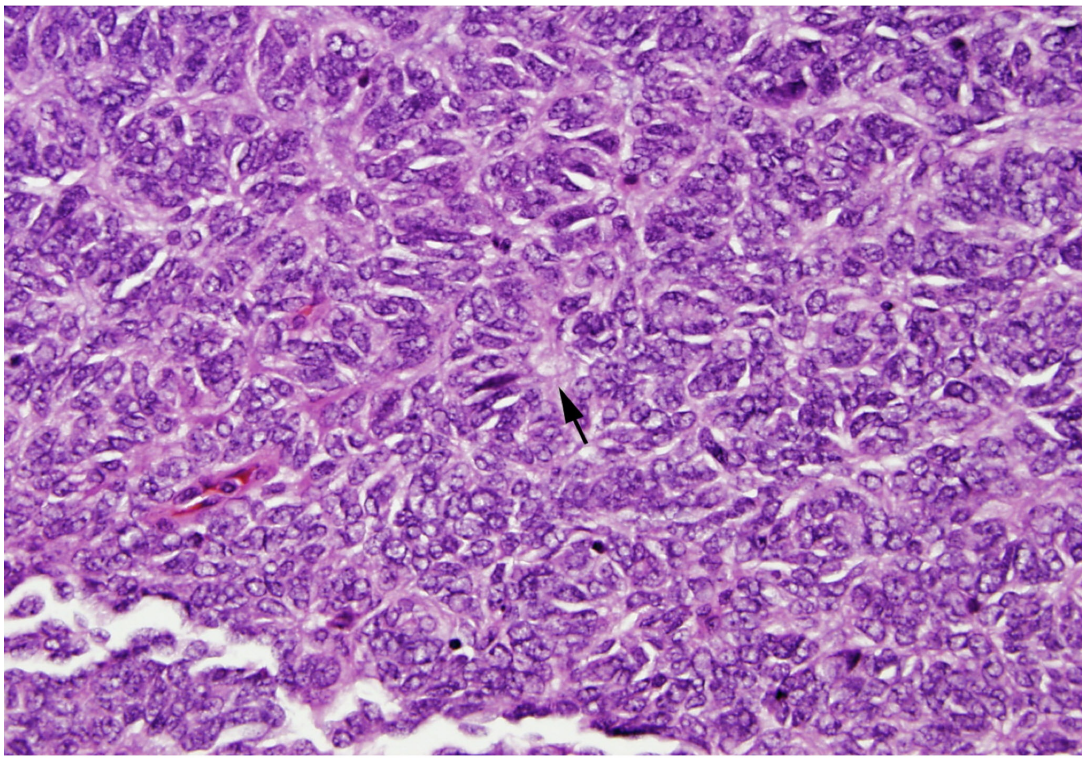
P 13-37 Pineoblastoma. Sheets of densely packed cells with high grade (anaplastic / undifferentiated) features including high N/C ratio with minimal cytoplasm and large hyperchromatic nuclei, mitotic activity and focal nuclear moulding and Homer Wright or Flexner-Wintersteiner rosettes.



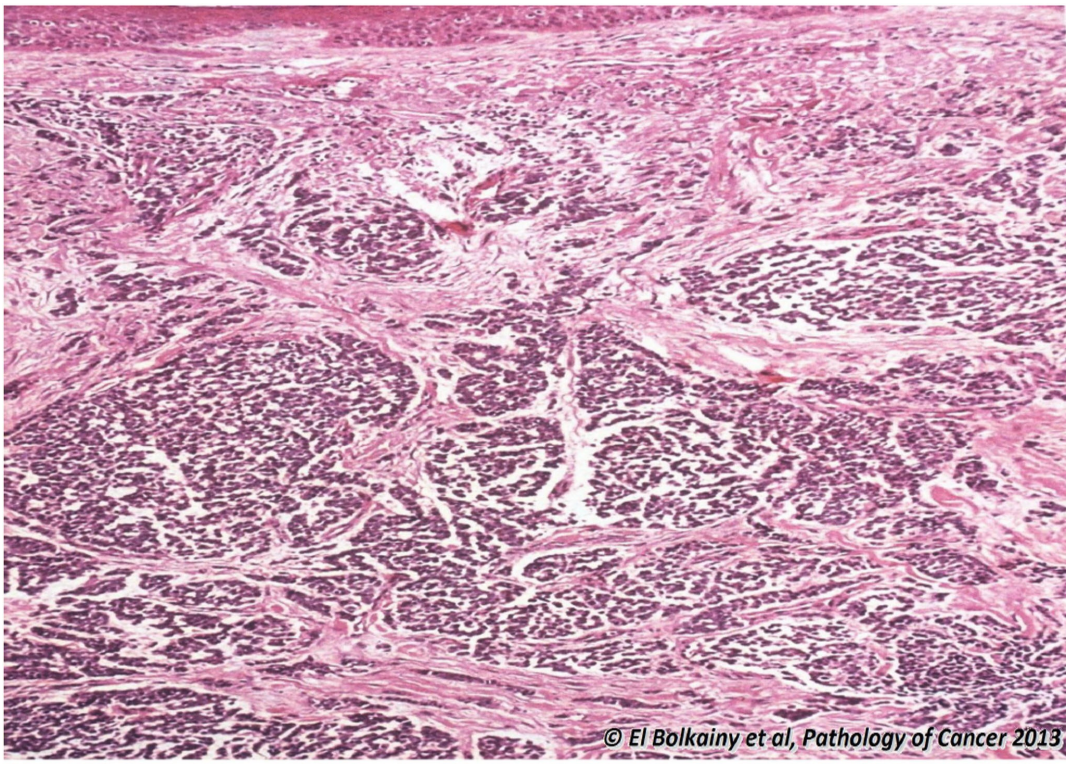
P 13-38. Olfactory neuroblastoma. Nests of round cells with neurofibrillary areas enclosed by fibrovascular stroma containing sustentacular cells (organoid pattern). Homer-Wright pseudorosettes and the Flexner Wintersteiner true rosettes are identified.



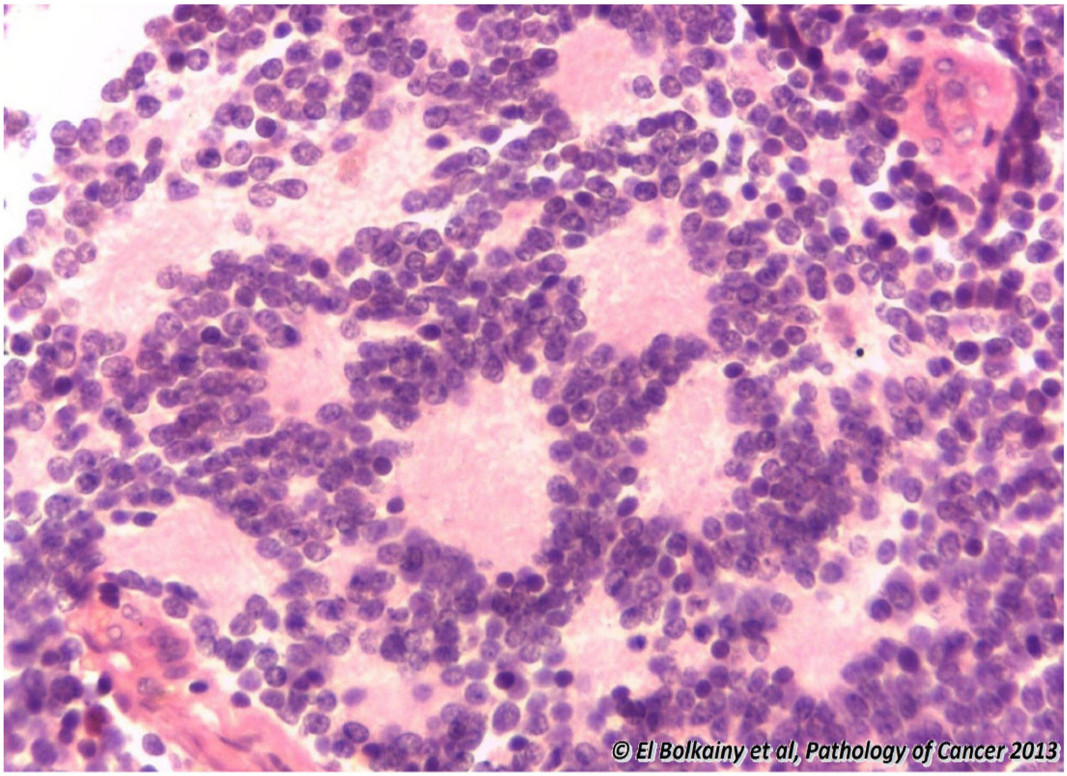
P 13-39 Ewing sarcoma. Uniform round cells with fine dispersed chromatin and vascular stroma. Surface immunoreactivity to CD99 (MIC2) and FLI-1 are confirmatory markers. **A**. Low power. **B**. High power. Tumor tissue away from blood vesseles undergos necrosis. (Molecular genetics, EWS-FLI-1; t(11;22) (q24;q12)).



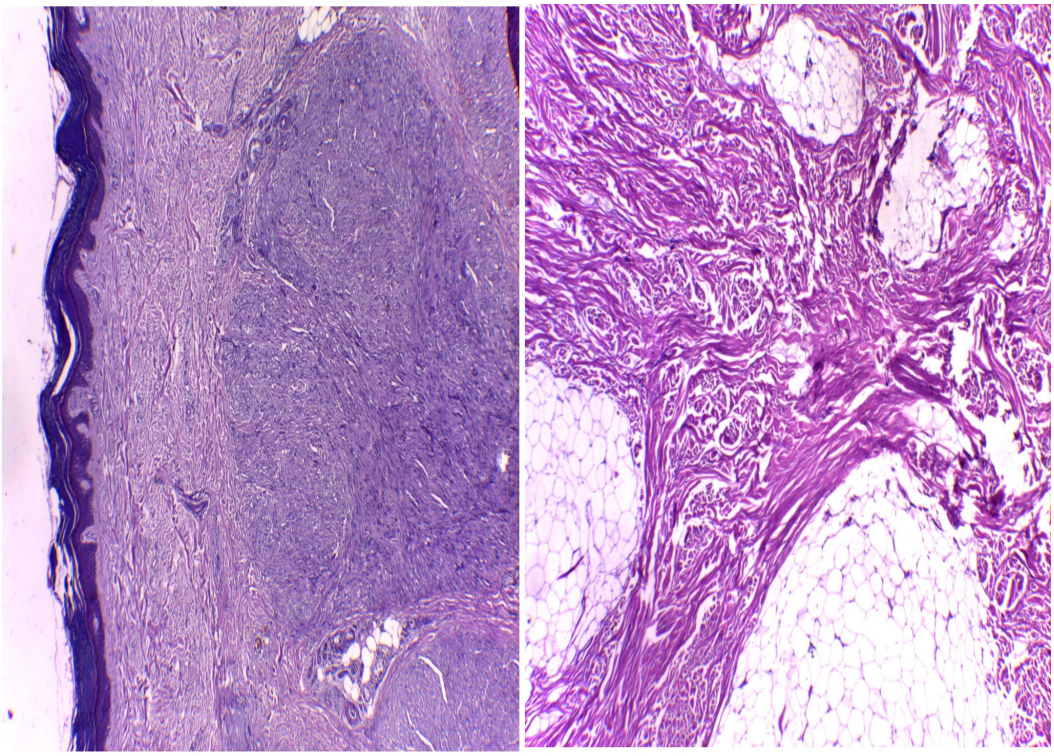
P 13-40. Askin tumor, PNET of chest wall. Sheets of uniform, round blue cells with clear to eosinophilic cytoplasm and intracytoplasmic glycogen (diastase digestion on PAS stain). Occasional pseudorosettes (arrow), features of neuroectodermal differentiation, may be detected (Courtesy of PathologyOutlines.com).



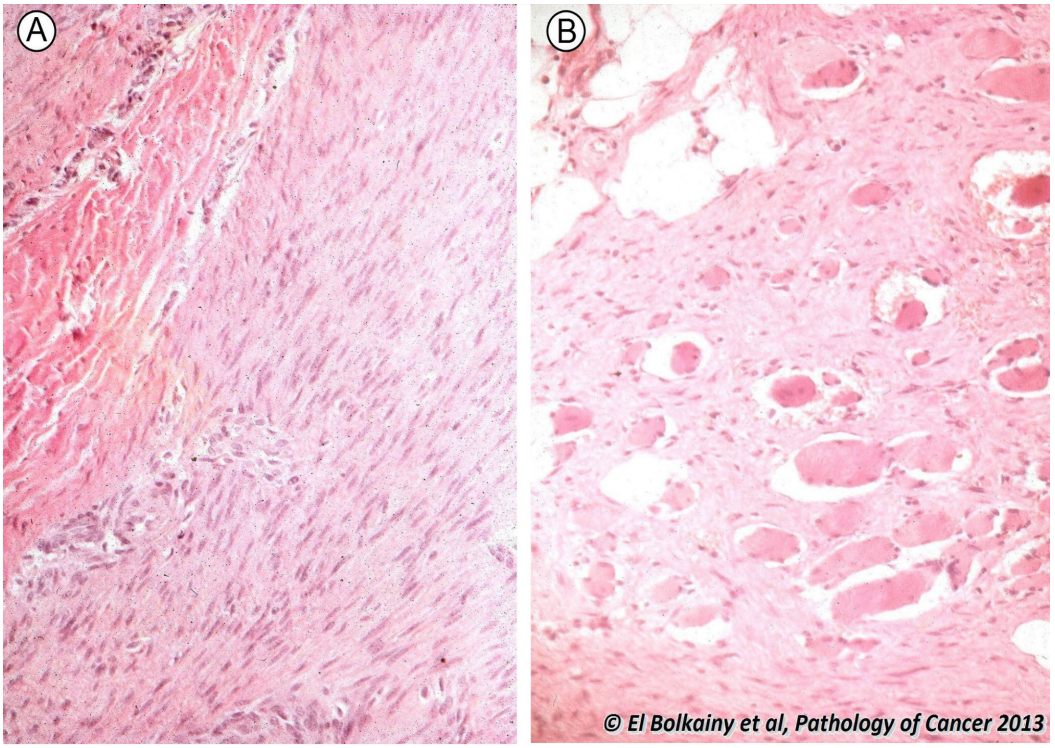
P 13-41 Skin. Merkel cell carcinoma. Ulcerating skin nodule associated with infiltrstive pattern. Crowded cells with scanty cytoplasm, nuclei with finely dispersed chromatin and active mitosis. CK20 immunoreactivity with charachteristic dot-like paranuclear pattern. Merkle cell virus is evident in the tumor by PCR in 80% of cases.



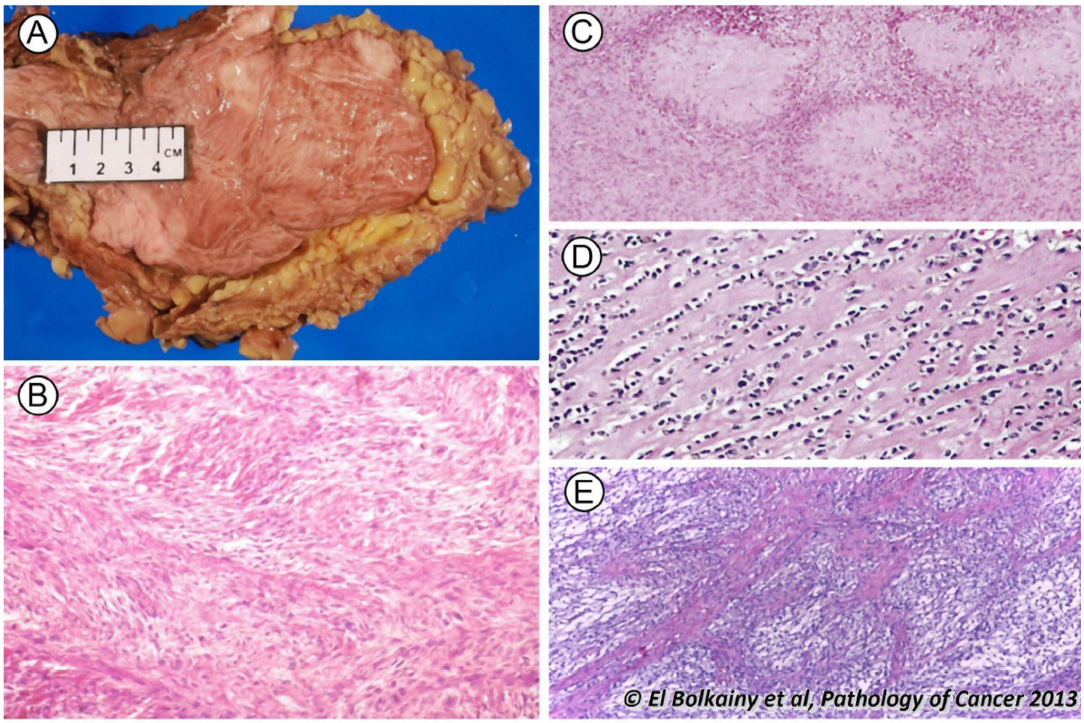
P 13-42 Soft tissue. Neuroepithelioma. Round cells are PNET with solid vaguely nodular pattern and shows numerous pseudorosettes of Homer-Write type. (lumen filled with fibrillary material)



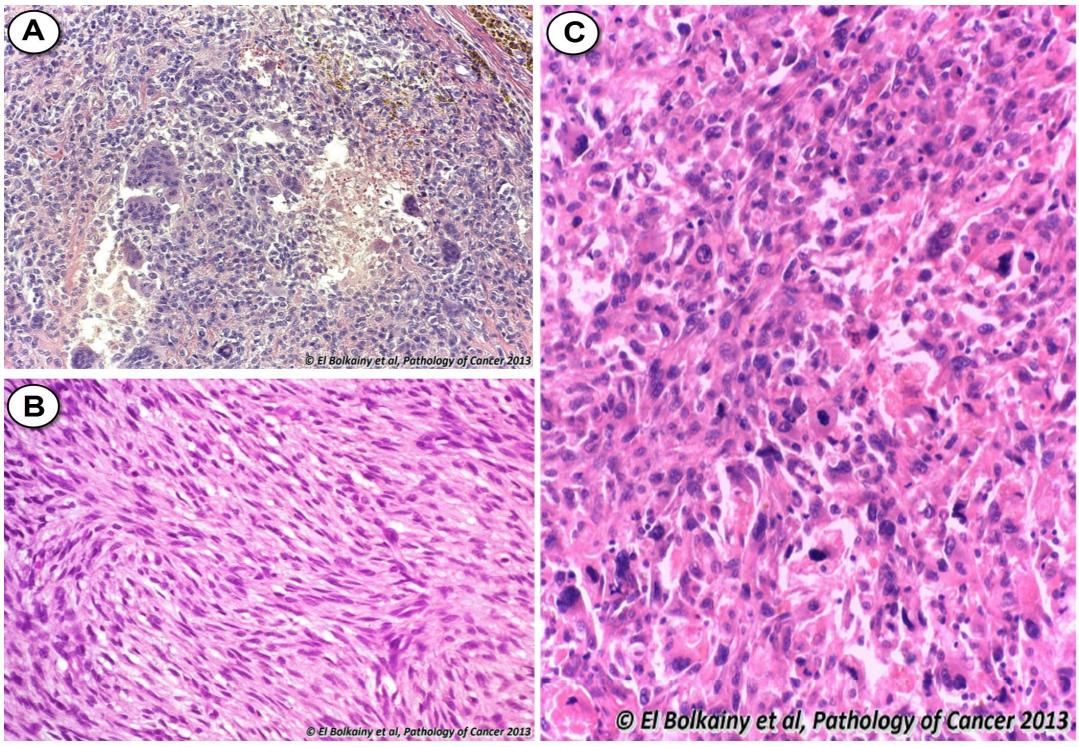
P 13-43 A. Dermatofibroma. Thinning of epidermis with underlying Grenz zone overlying derma lesion formed of mixture of fibroblastic, myofibroblastic-like and histiocytic cells. **B.** Nuchal type fibroma, Strands of acellular collagen mixed with fat, Lesion is very hypocellular, differentiating it from fibromatosis



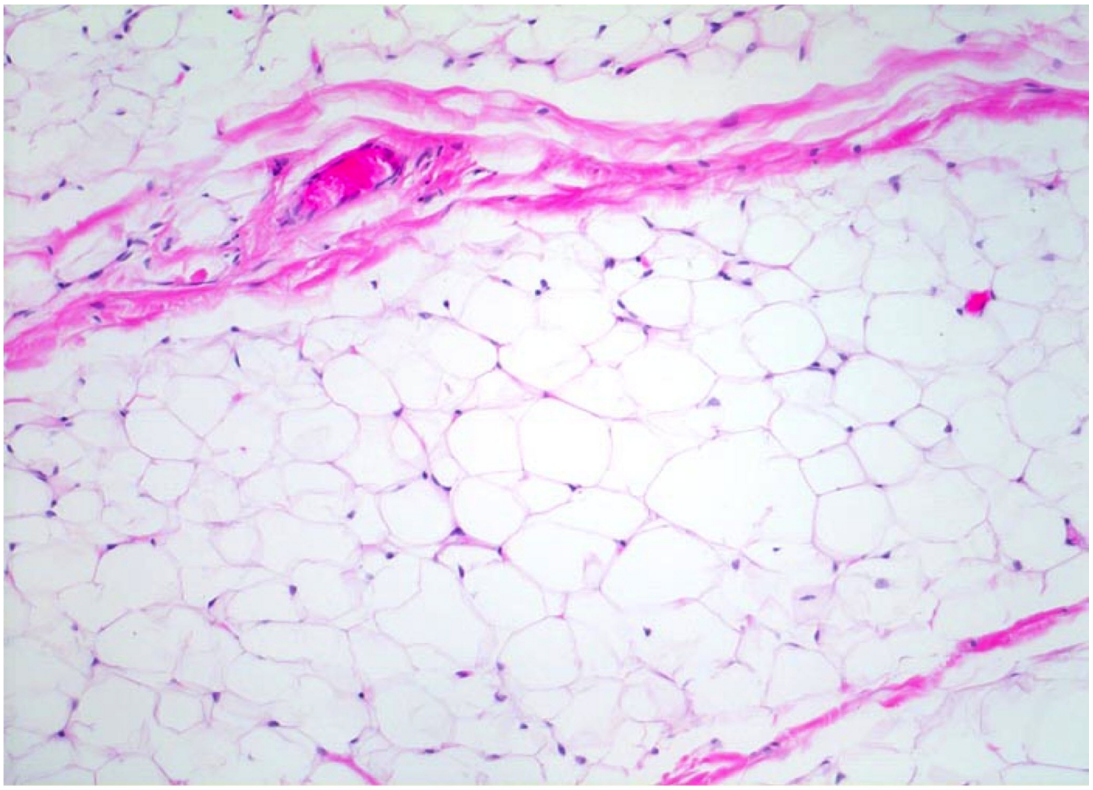
P 13 44 soft tissue. Fibromatosis **A.** Hypocellular tumor, the stromal collagen is more than myofibroblasts, lacks mitotic figures. The cells have ill defined cytoplasm. Rarely, metastatic osteoid component may be evident (osteofibromatosis) Nuclear immunoreactivity for beta-catenin is confirmatory, Ki-67 is < 2%. **B.** Tumor margin showing muscle invasion.



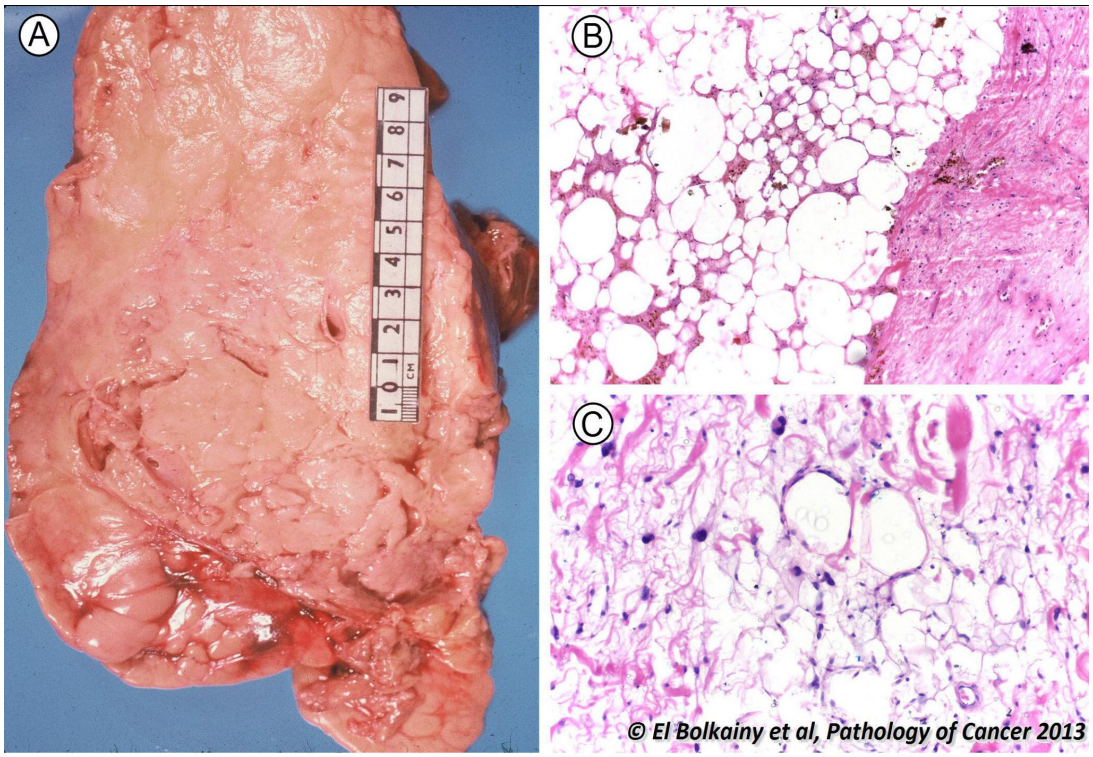
P 13-45 Soft tissue. Fibrosarcoma and its variants. **A.** Gross trabeculated appearance. **B** Conventional type, hypercellular tumor (fibroblasts more than collagen), short bundles crossing at angles (Herring-bone), well defined cytoplasm, pointed nuclei and mitosis (>2/10HPF). **C.** Low grade myxohyaline sarcoma, with giant pseudorossettes. **D**. sclerosing epithelioid sarcoma. **E**. Myxofibrosarcoma, myxoid areaas >30% of tumor.



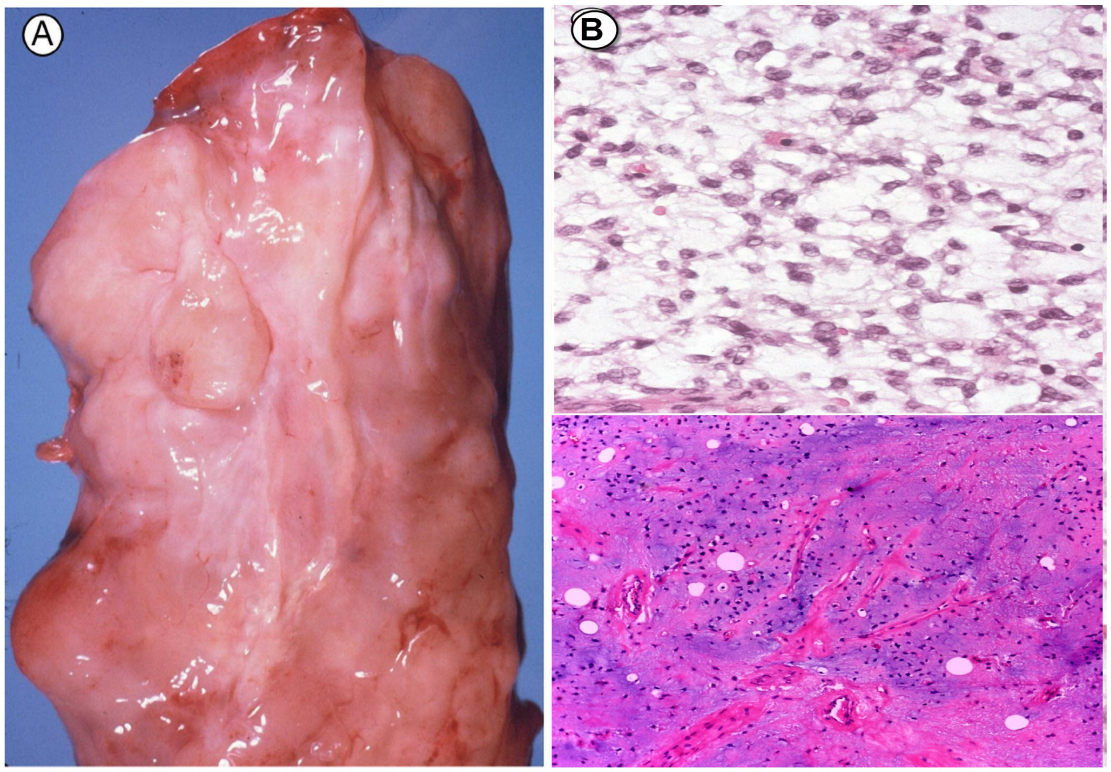
P 13-46 Fibrohistiocytic tumors. **A.** Giant cell tumor of tendon sheath, neoplastic mononuclear cells of fibrohistiocytic origin and reactive giant cells. **B**. Dermatofibrosarcoma protuberans, cellular tumor with spindled fibroblasts in storiform pattern. **C,** Pleomorphic undifferentiated sarcoma/Pleomorphic MFH, malignant spindle cells and pleomorphic giant cells elements with active mitosis.



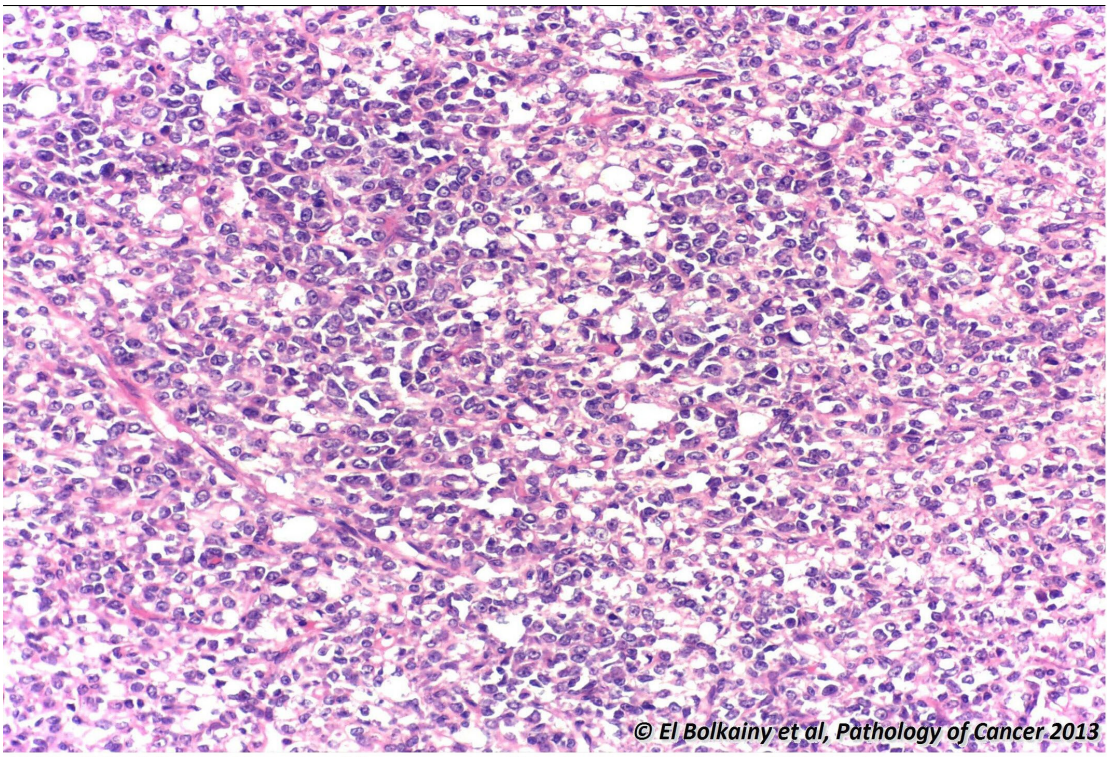
P 13-47 Soft tissue. Lipoma. Lobules of mature uniform fat cells with indistinct nuclei and thin fibrous septa.



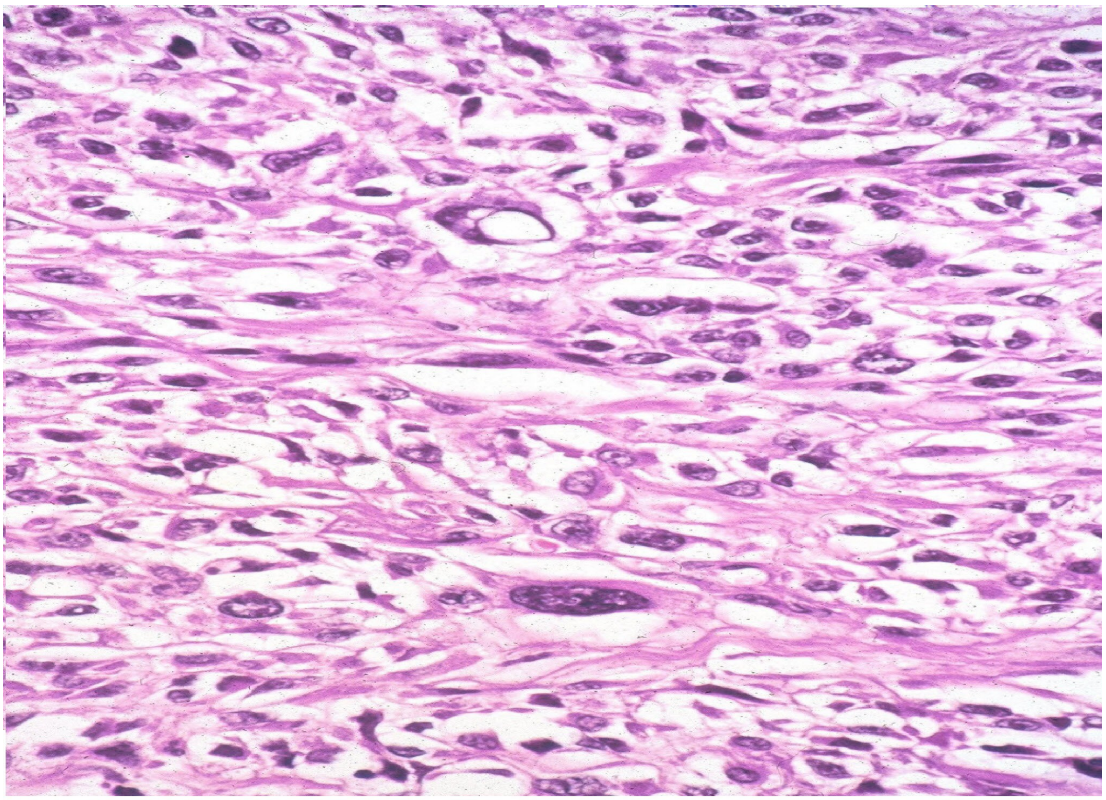
P 13-48 Soft tissue. Atypical lipomatous tumor (well differentiated liposarcoma) **A** Gross, large circumscribed lobulated tumor **B** and **C** Marked variation in size of fat cells associated with pleomorphic cells. Lipoblasts exist in fibrovascular trabeculae. Immunoreactive for S100,MDM-2 and CDK-4.



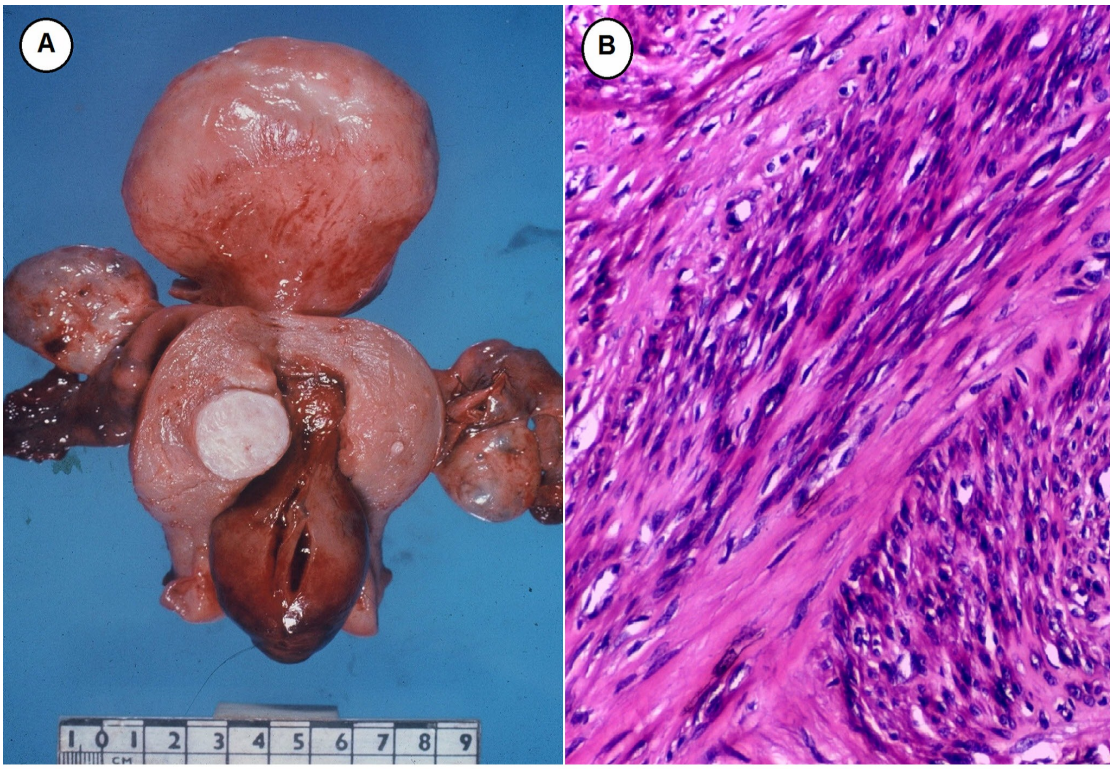
P 13-49 Soft tissue. Myxoliposarcoma. **A**. Gross, a circumscribed tumor with tan gelatinous cut section. **B**. Proliferating spindle cells and lipoblast (S100+) in a myxoid stroma rich in plexiform arborizing blood vessels. (Molecular genetics: FUS-CHOP; t(12;16) (q13;q11)).



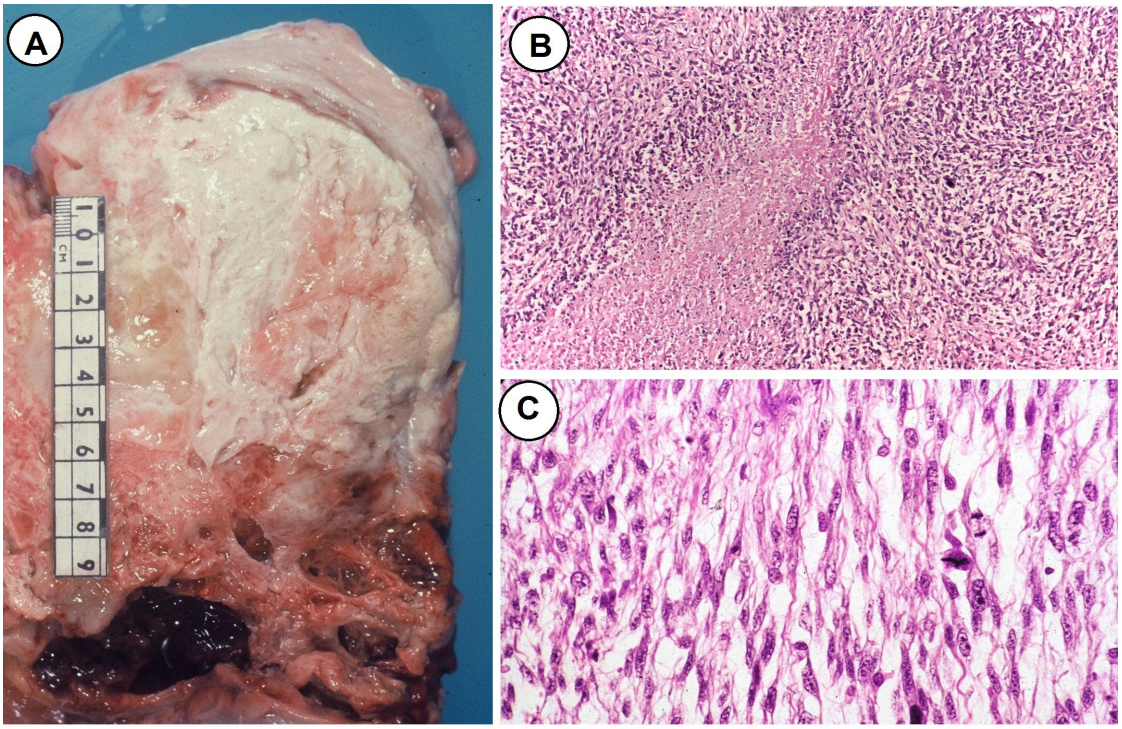
P 13-50 Soft tissue. Round cell liposarcoma. The diagnostic criteria of this high grade subtype is the presence of S100 positive round cells in > 80% of the tumor. It may be de novo or the result of dedifferentiation of low grade liposarcoma.



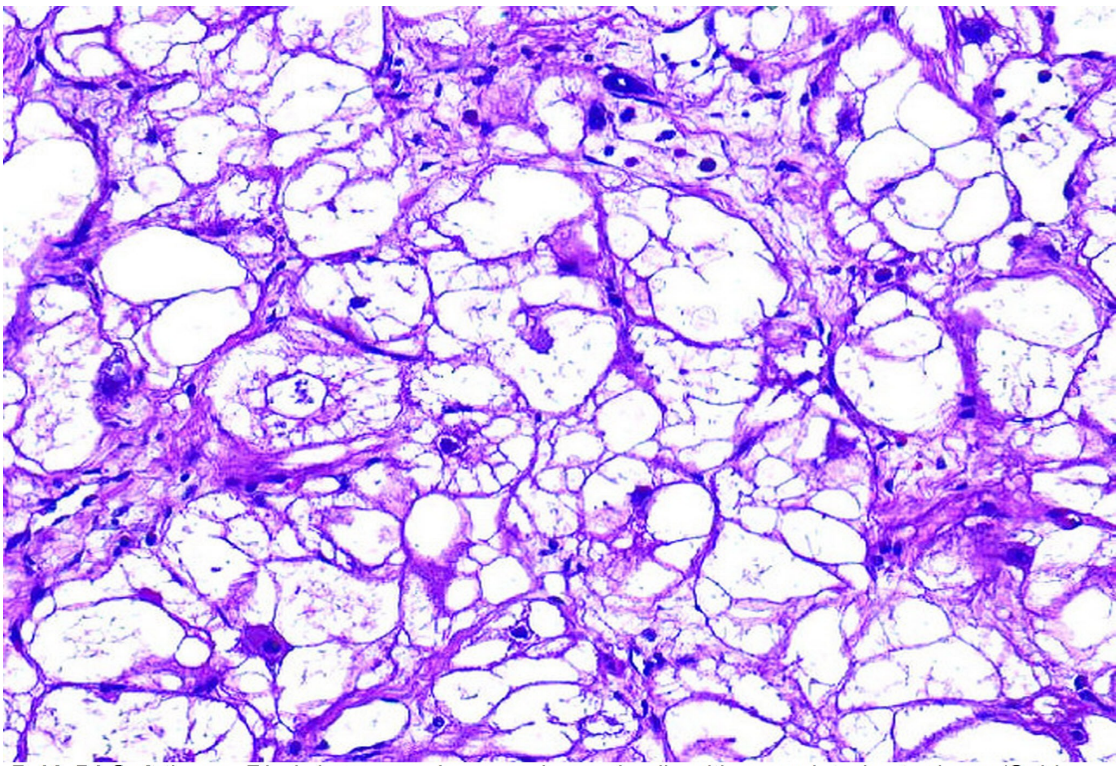
P 13-51 Soft tissue. Pleomorphic liposarcoma. A mixture of spindle, round and pleomorphic giant cells with multiple cytoplasmic vacuoles. All are positive for S100.



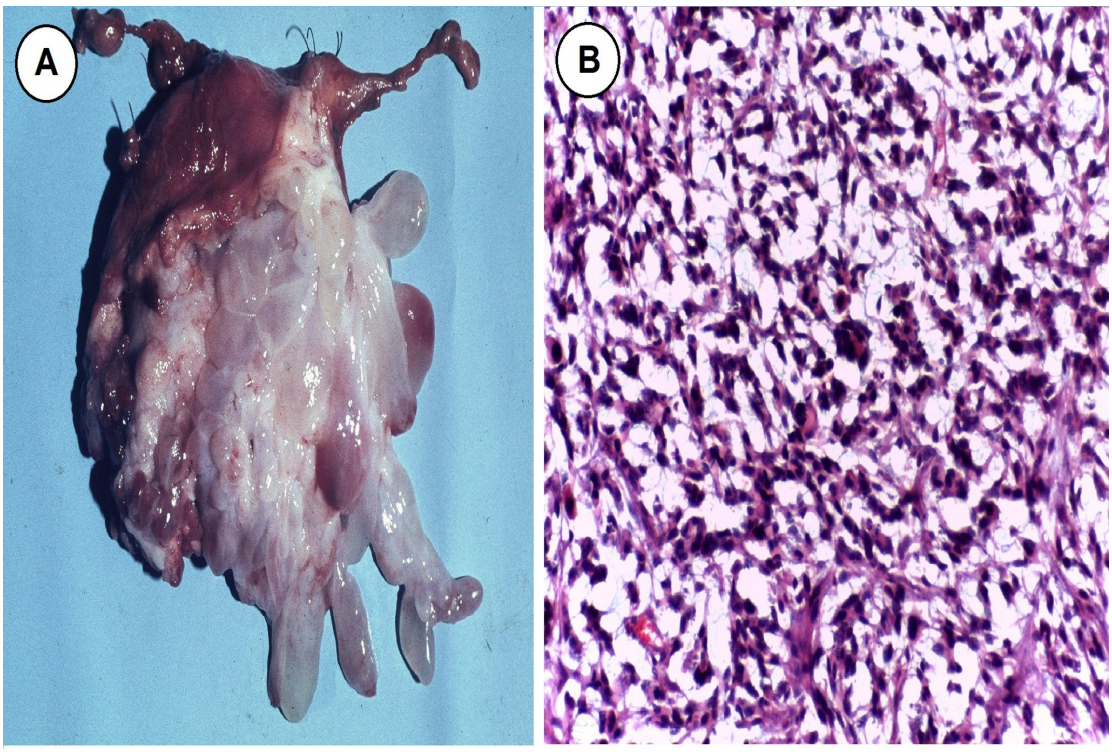
P 13-52 Leiomyoma**. A** Multiple leiomyomas of uterus, subserous, intramural and submucous with strangulation. **B** Histology of charactaristic interdigitating pattern with round and spindle bundles sections.



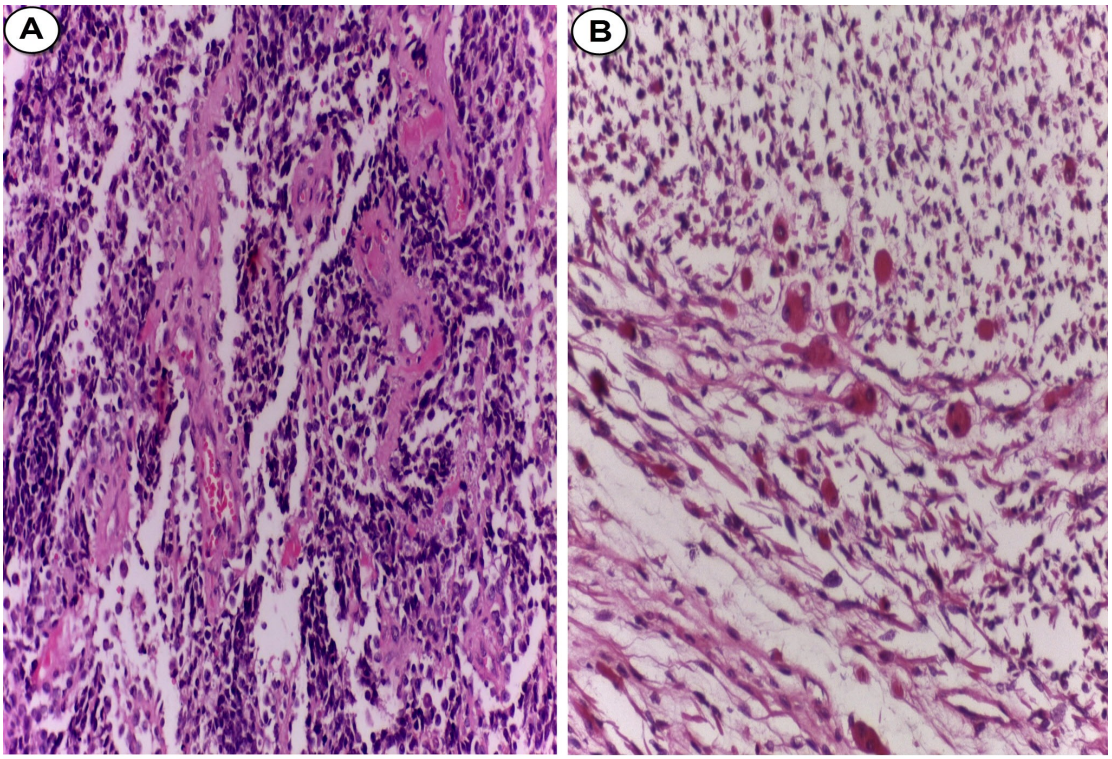
P 13-53 Uterus. Leiomyosarcoma. Gross. **A**. Gross, a large mass (10 cm) gray color with focal hemorrhage and necrosis, soft in consistency (pitting) and the margins invade the myometrium. Histology **B**. Histology, hypercellular tumor with focal necrosis **C**. High power Active mitosis (>10/10 HPF), abnormal mitosis. Tumor cells are positive for SMA and Desmin.



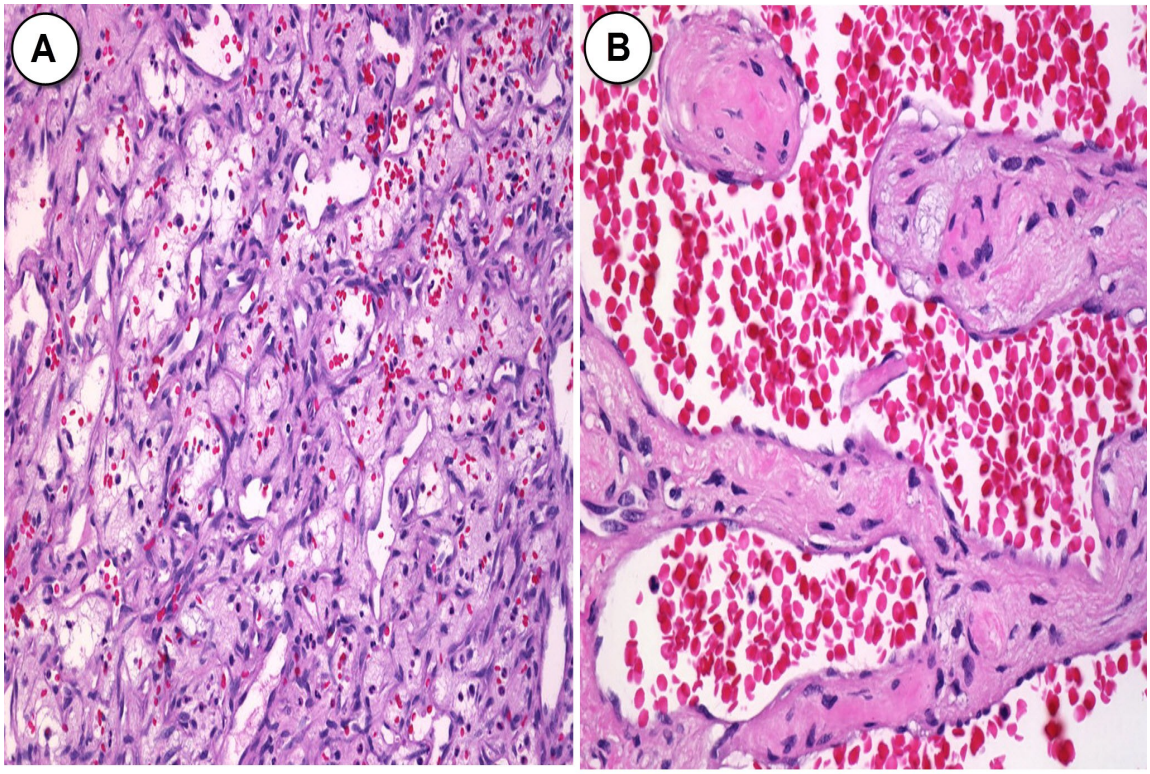
P 13-54 Soft tissue. Rhabdomyoma. Large polygonal cells with vacuolated cytoplasm (Spider cells) small round vesicular nuclei and well-defined cellular borders. Common sites includesoft tissue of the head and neck (fetal and adult types), vagina and vulva (genital type).



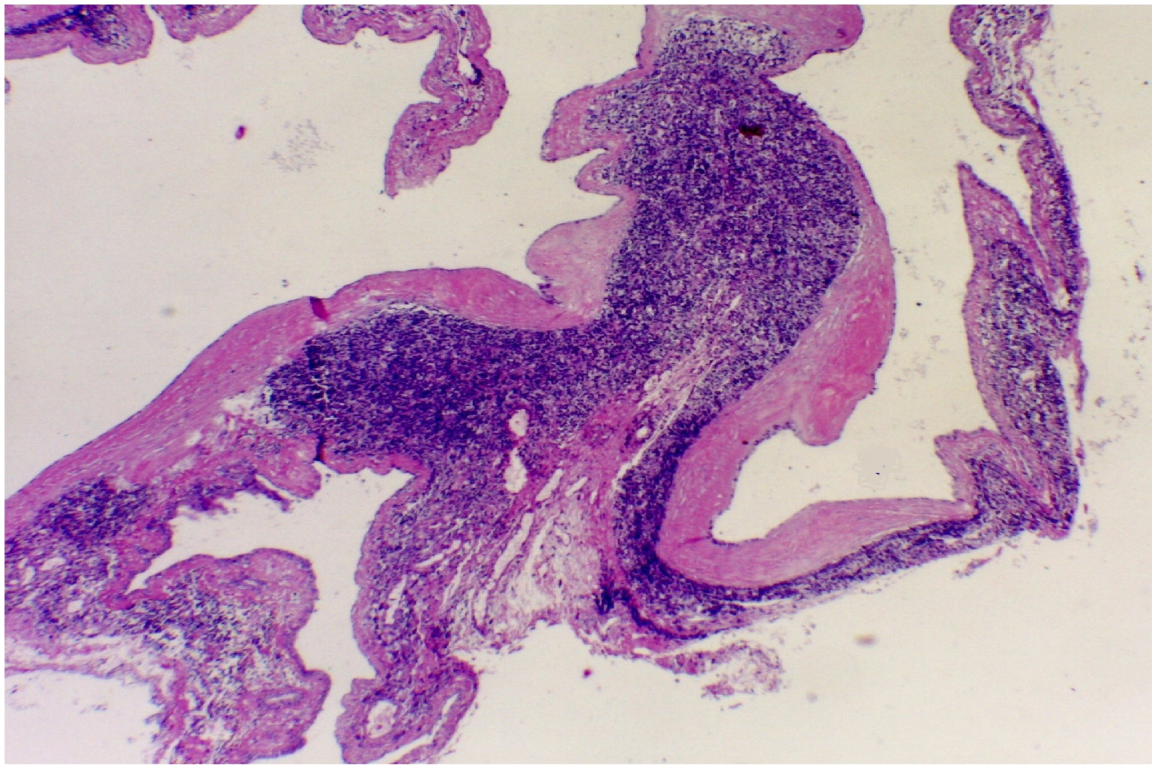
P 13-55 Vagina, Sarcoma Botryoides (embryonal rhabdomyosarcoma) A. Gross, soft, polypoid grape-like tumor protrude from vaginal orifice. B. Histology. Numerous rhabdomyoblasts with brightly eosinophilic cytoplasm and occasional multinucleated strap cells. Myogenin and MyoD immunostains are highly specific and sensitive for diagnosis.



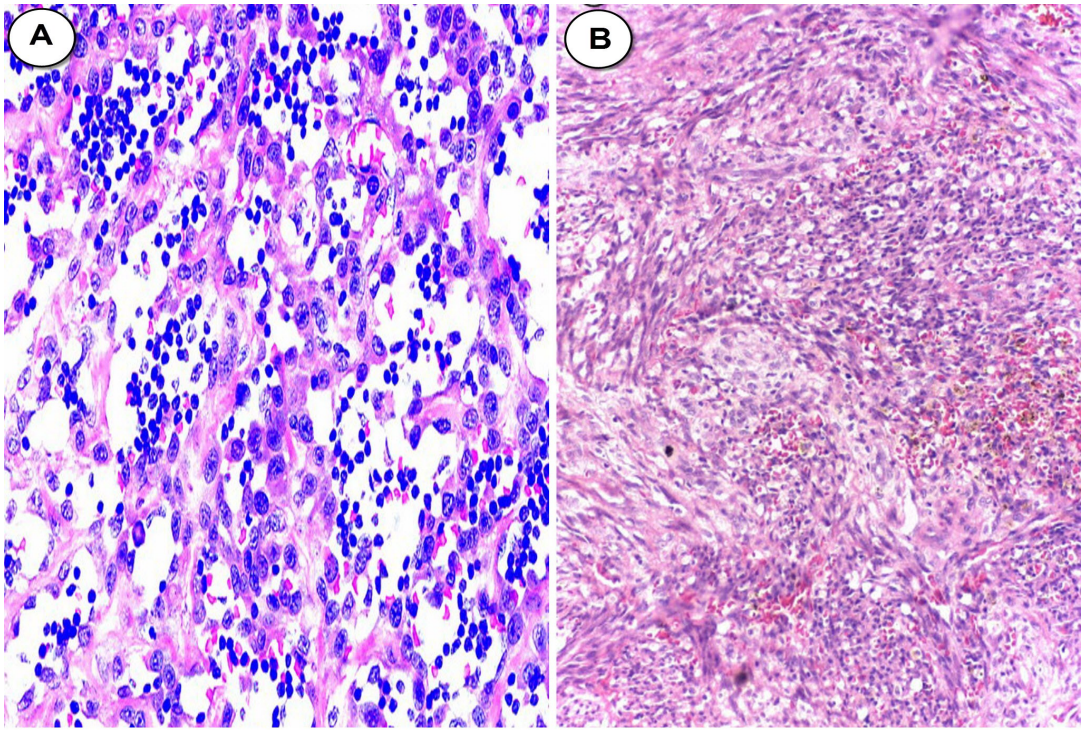
P 13-56 A. Alveolar rhabdomyosarcoma, fibrovascular septa separating tumor cells into discrete nests containing central clusters and discohesive periphery. **B**. Pleomorphic rhabdomyosarcoma, large atypical polygonal eosinophilic cells together with round to spindle cells. (Molecular genetics: PAX-3-FKHR; t(2;13) (q13;q11)).



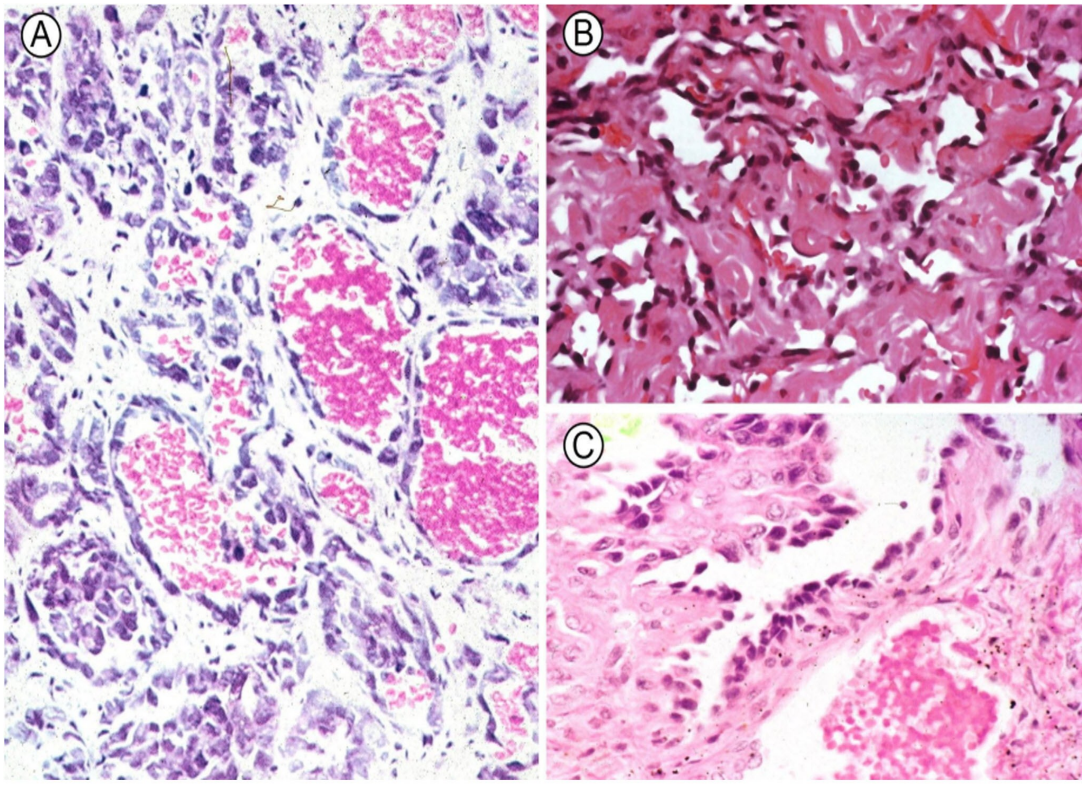
P 13-57 Hemangioma **A**. Capillary hemangioma,closely packed small capillary sized vessels, filled with RBCs. **B**. Cavernous hemangioma, large cystically dilated vascular spaces with thin walls. (Courtesy of PathologyOutlines.com)



P 13-58 Lymphangioma. Large lymphatic channels in loose connective tissue stroma, focally disorganized smooth muscle in the wall and peripheral lymphoid aggregates. Tumors with large cystic changes are termed cystic hygroma.



P 13-59 A. Lymphangiosarcoma, Angiosarcoma-like areas and endothelial lined spaces without RBCs, increased cellularity and pleomorphism with increased mitotic activity. such lesions may present early by what is called (atypical vascular proliferation), **B**. Kaposi sarcoma, proliferating spindle cells around slit-like vascular spaces with extravasated RBCs, spindle cells are immunorecative for CD34.



P 13-60 Angiosarcoma. **A**. Irregular vascular spaces lined by anaplastic pleomorphic endothelium, with active mitosis. **B.** and **C**. Seive-like and diffuse patterns are common as well as associated hemorrhage and necrosis.