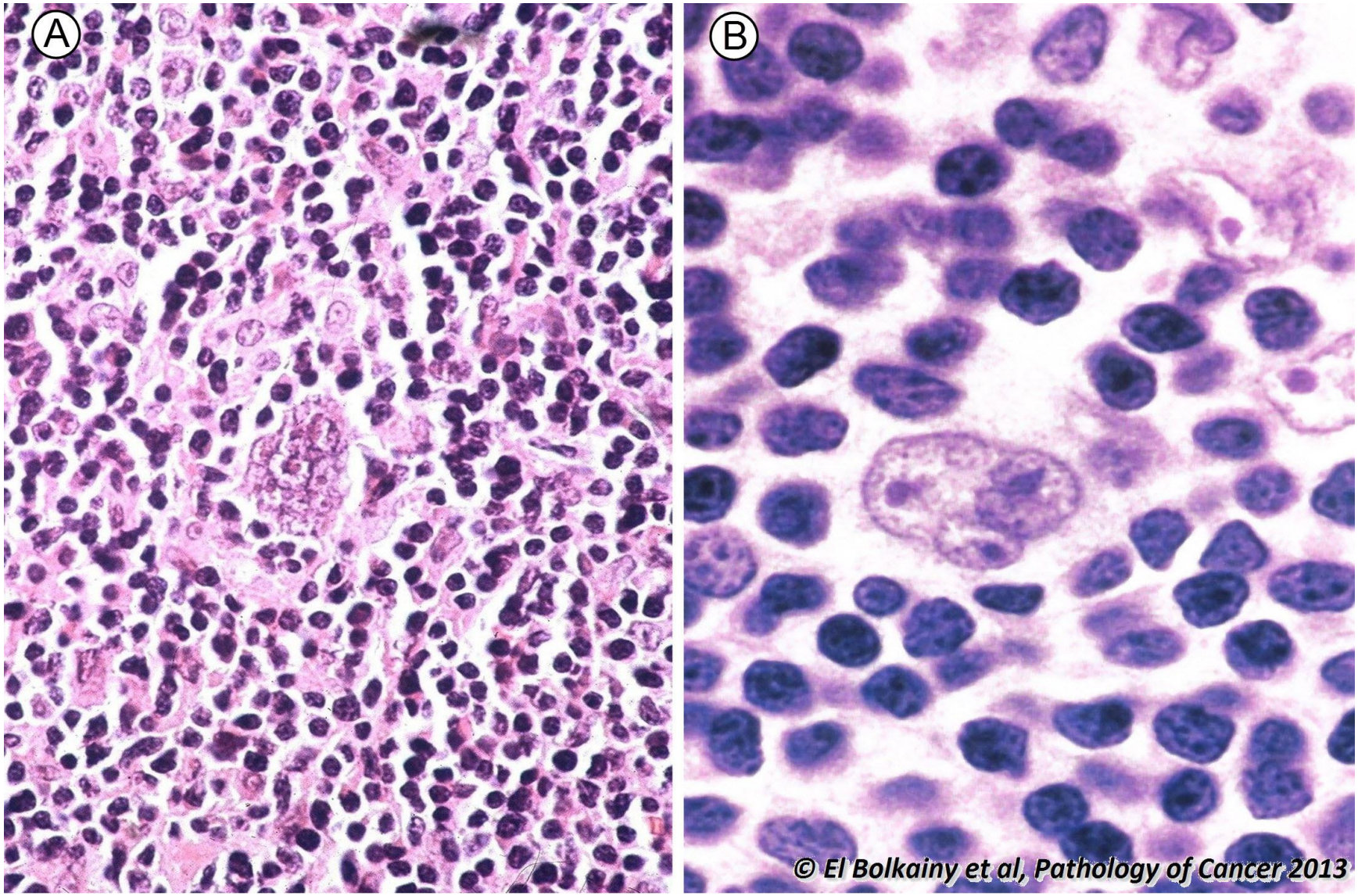
Chapter 25

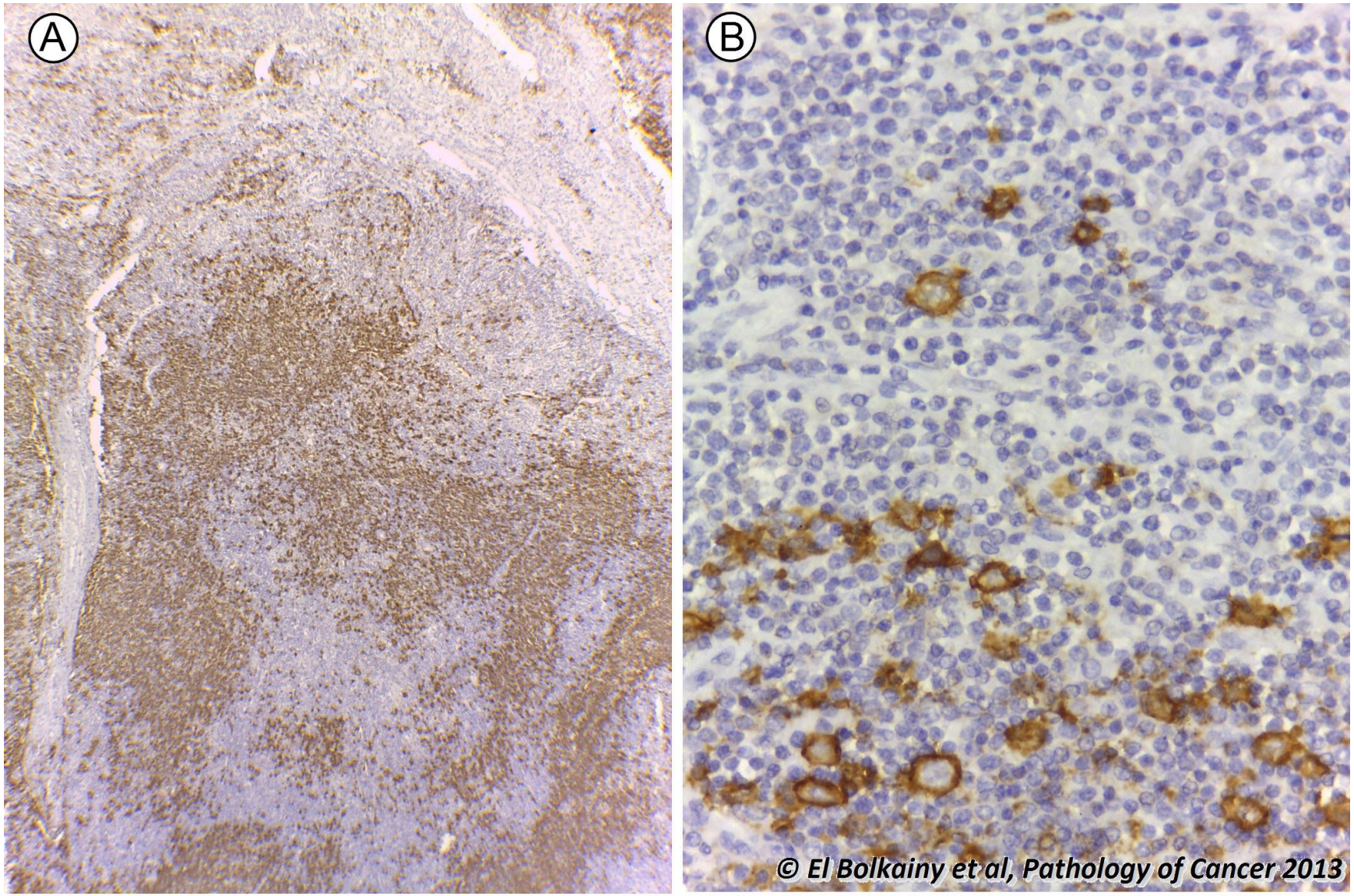
Hematolymphoid malignancies

25.1 Nodular lymphocyte predominance Hodgkin lymphoma.



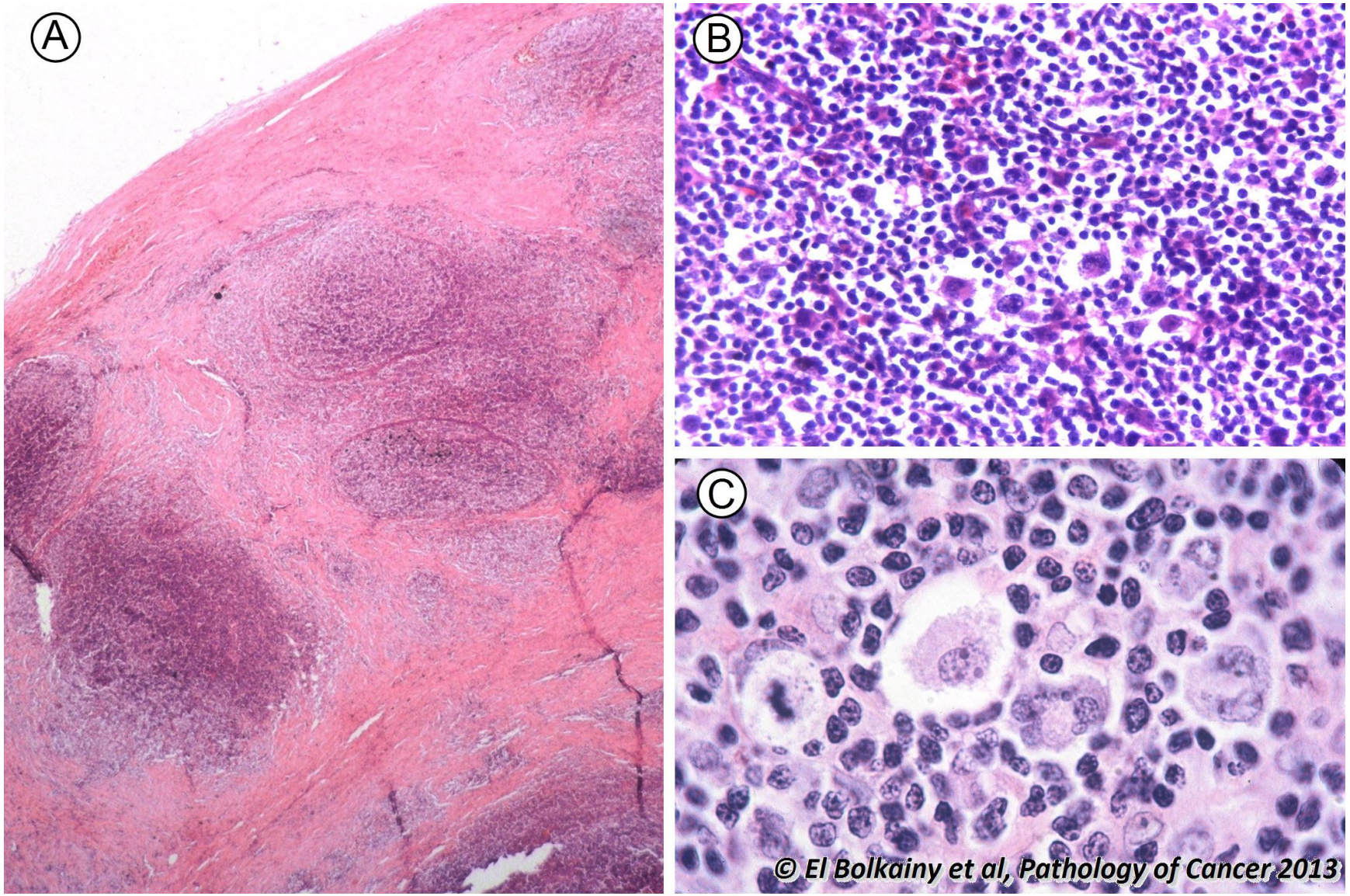
Picture 25-1 **Nodular lymphocyte predominance Hodgkin lymphoma. A** Low power, multilobed Reed-Sternberg giant cells and background of reactive cells. **B** High power, Reed-Sternberg giant cells (pop-corn type), multilobed vesicular nuclei with small nucleoli.

25.2 Nodular lymphocyte predominance Hodgkin lymphoma, CD20 immunostain.



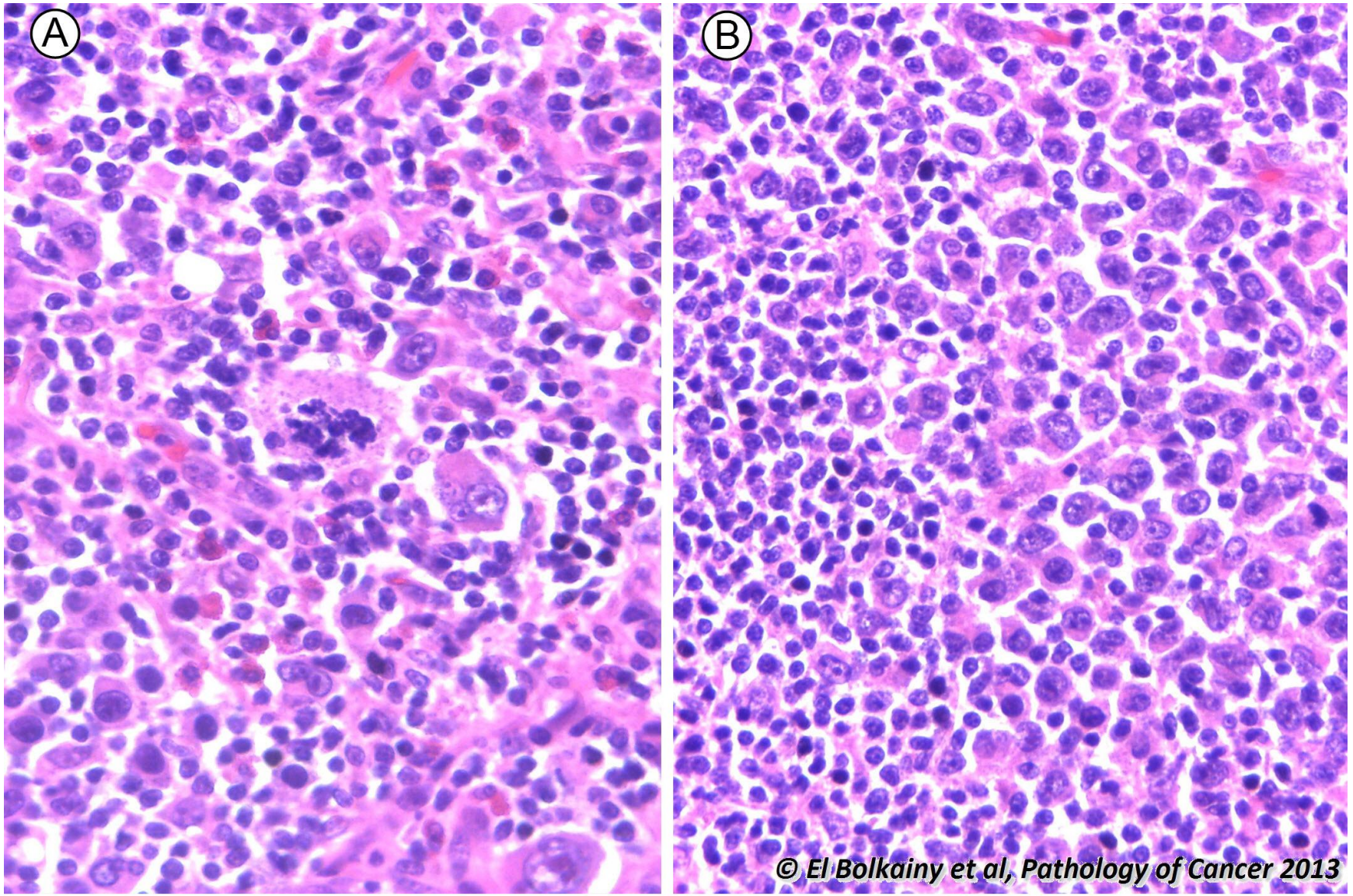
Picture 25-2 **Nodular lymphocyte predominance Hodgkin lymphoma, CD20 immunostain. A** Low power, the vague nodularity is more apparent than H&E stain. **B** High power, pop-corn RS cells show membrane immunoreactivity to CD20, background cells are T cells (CD3+) and histiocytes.

25.3 Hodgkin lymphoma, nodular sclerosis.



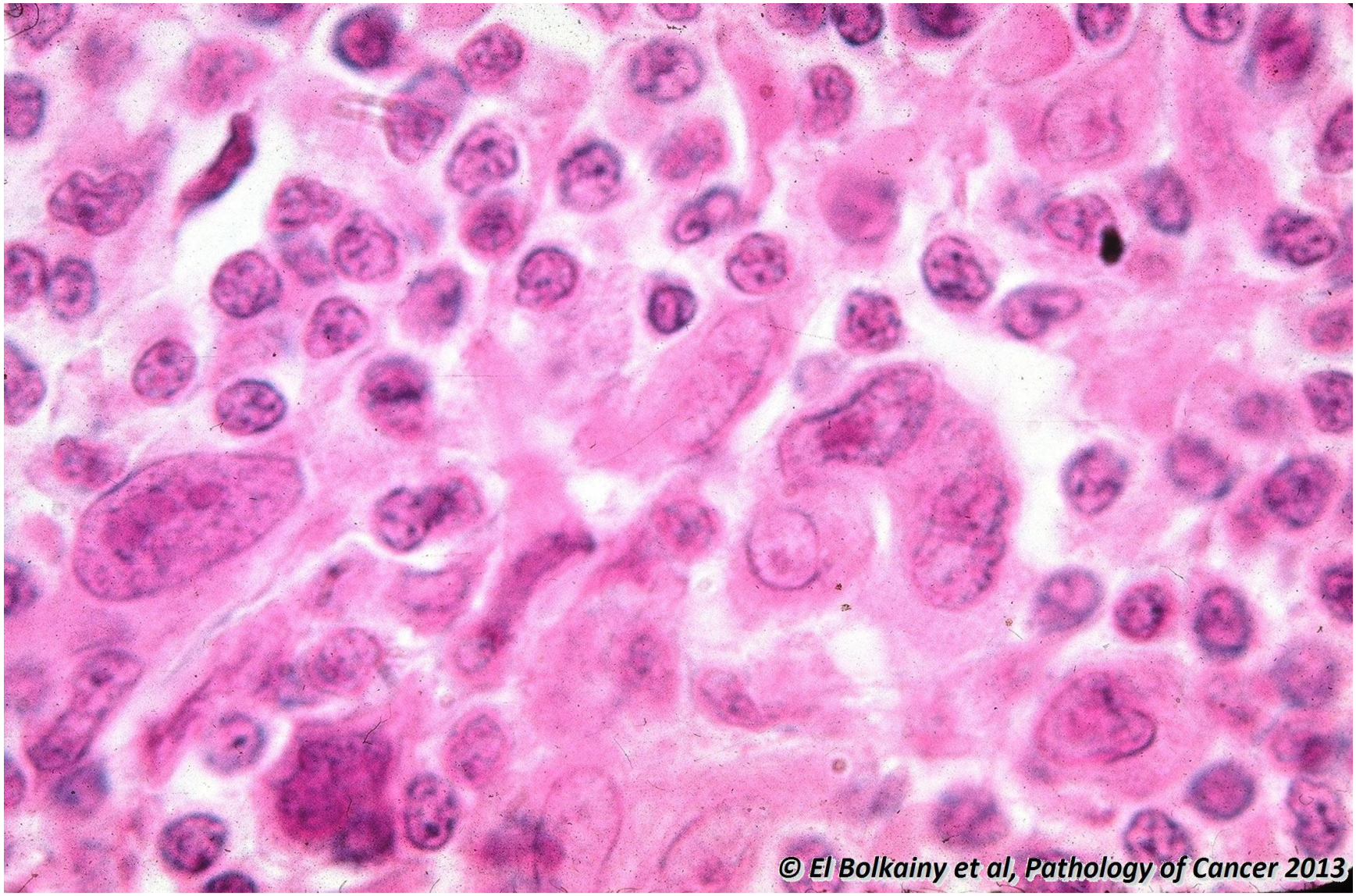
Picture 25-3 **Hodgkin lymphoma, nodular sclerosis. A** Low power, multiple lymphoid nodules surrounded by dense fibrosis. **B** Diagnostic RS giant cells, lacunar type are mononuclear with small nucleoli and surrounded by an empty space.

25.4 Hodgkin lymphoma, nodular sclerosis.



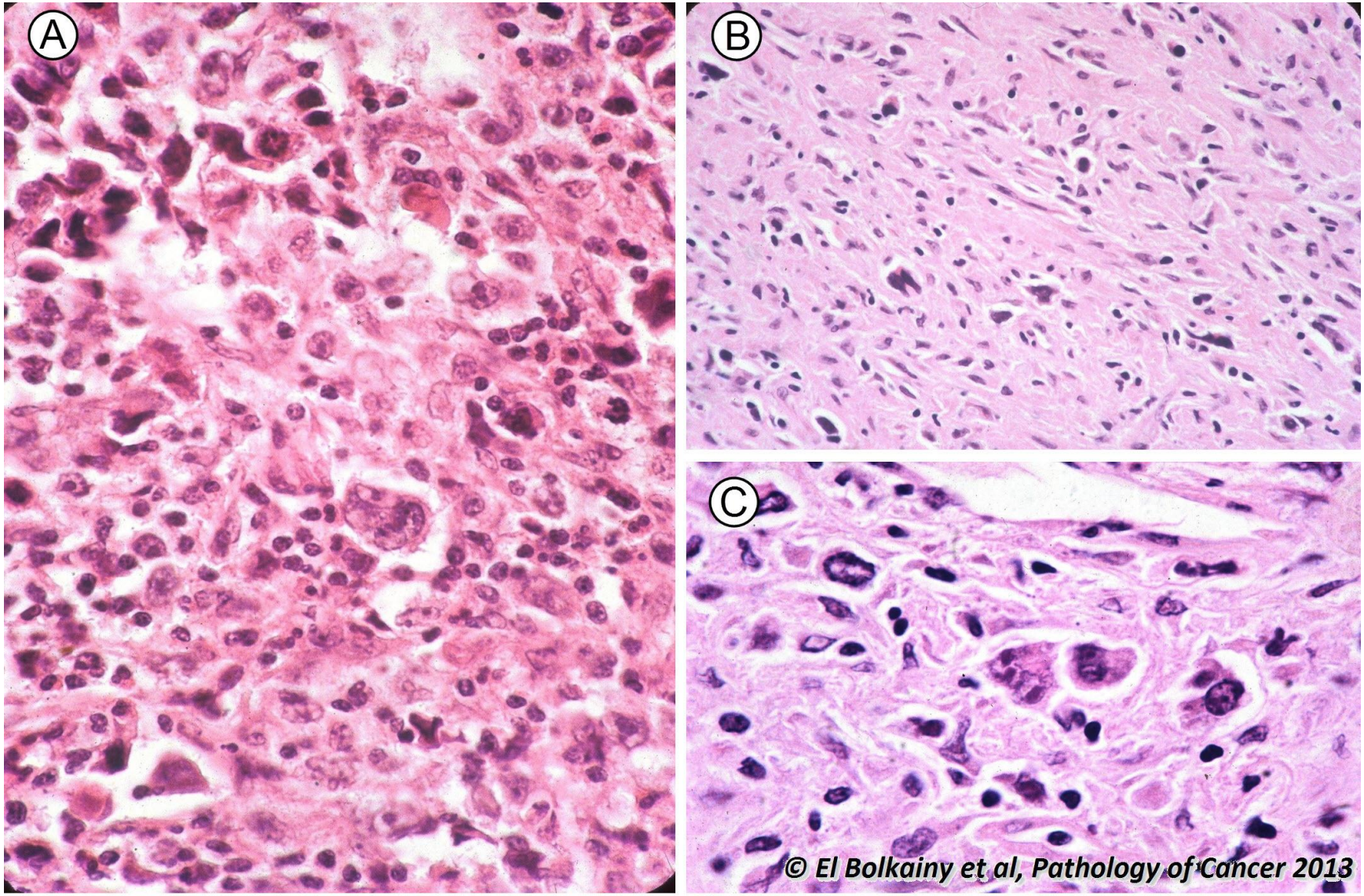
Picture 25-4 **Hodgkin lymphoma, nodular sclerosis. A** Lacunar cell showing abnormal mitosis. **B** Nodular sclerosis, syncytial type, note the solid sheet of lacunar cells which may be mistaken as metastatic carcinoma. Lacunar cells are CD30+ and CD15+.

25.5 Hodgkin lymphoma, mixed cellularity.



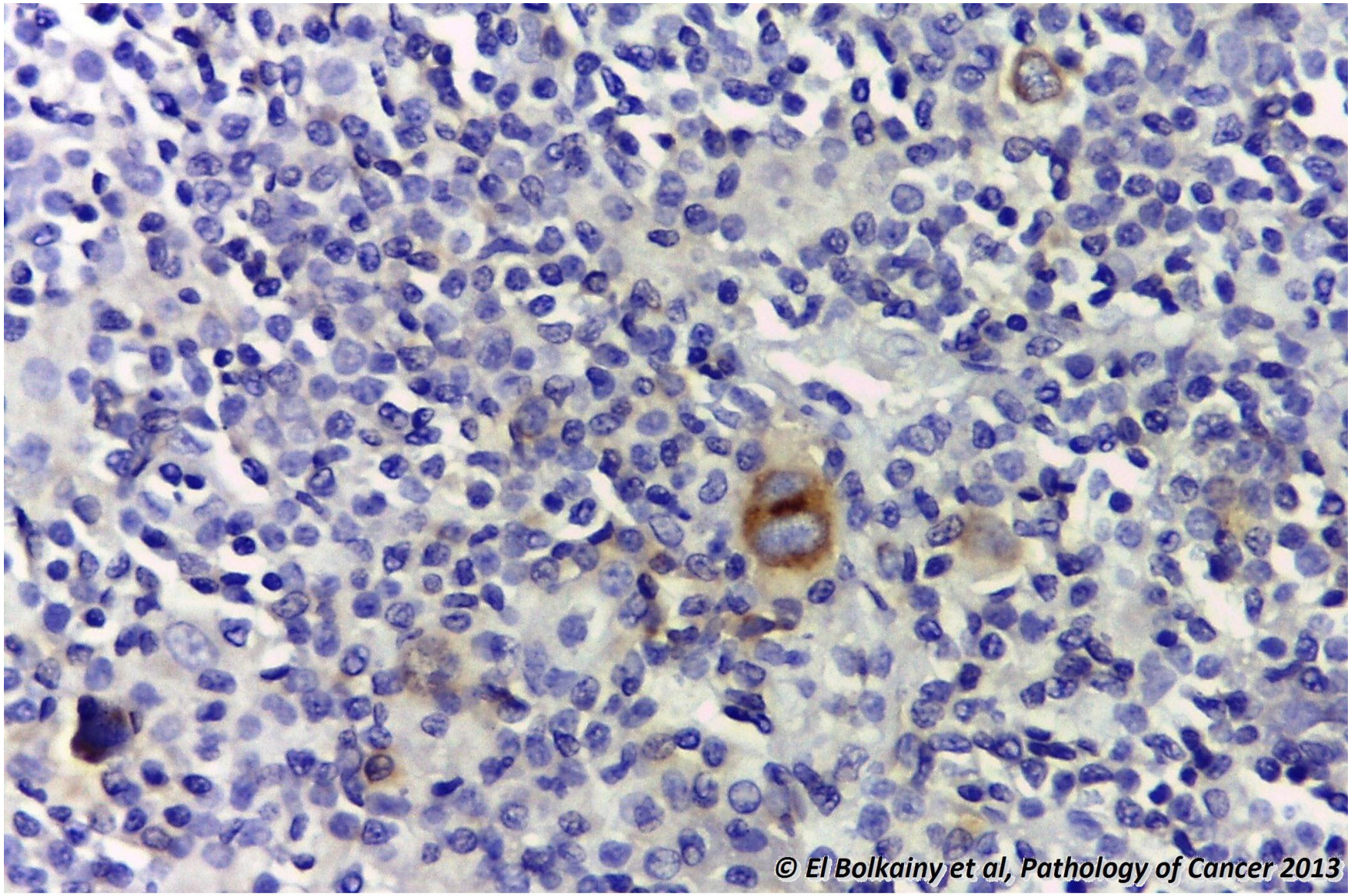
Picture 25-5 **Hodgkin lymphoma, mixed cellularity.** Classic Reed-Sternberg giant cells, mono and binucleated cells with very prominent nucleoli. Background cells include lymphocytes, eosinophils and histiocytes.

25.6 Hodgkin lymphoma, lymphocyte depletion (a rare subtype).



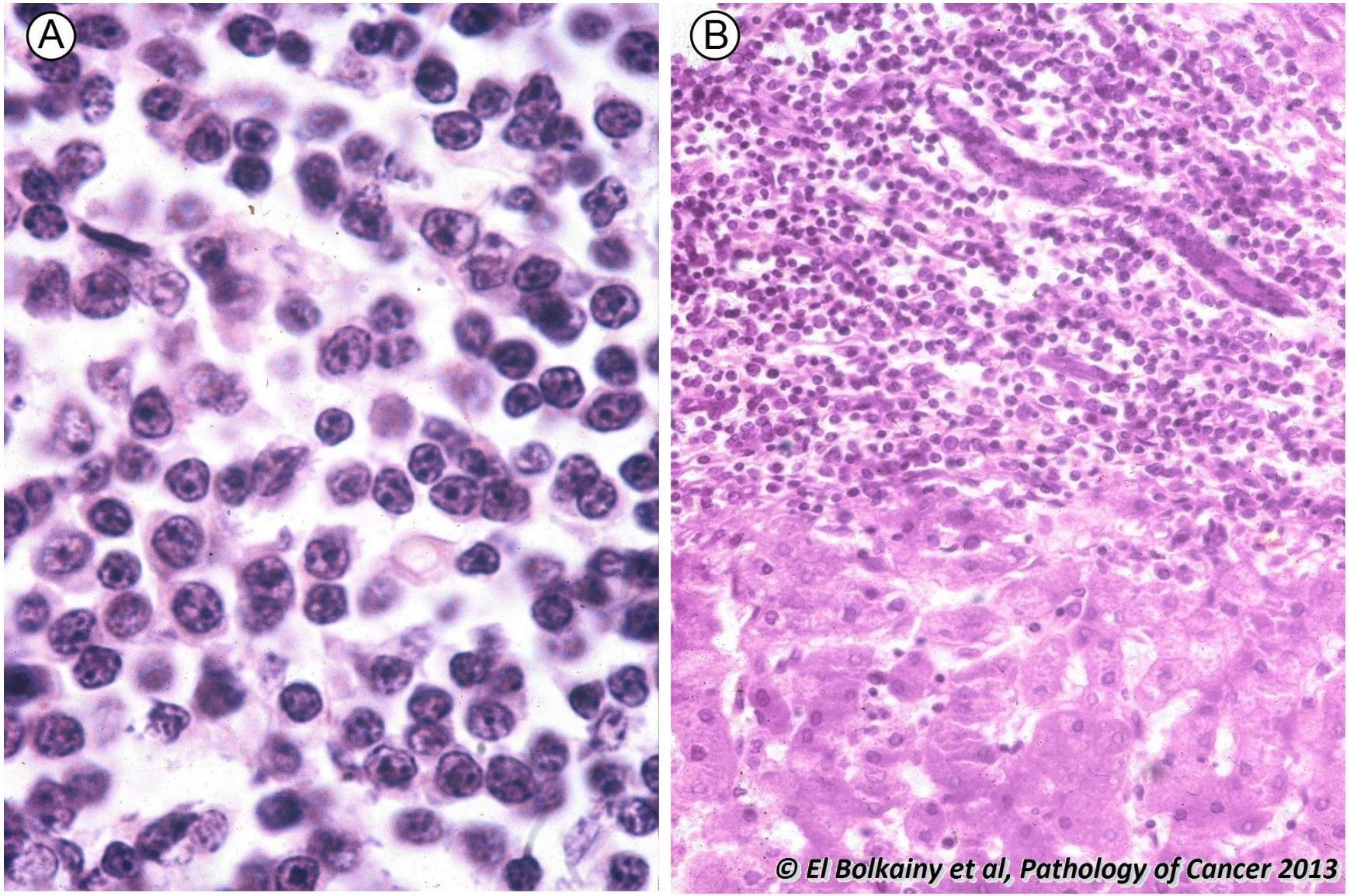
Picture 25-6 **Hodgkin lymphoma, lymphocyte depletion (a rare subtype). A** Reticular type rich in histiocytes. **B** and **C** Fibrous type rich in fibrosis. In both RS cells are diagnostic.

25.7 Hodgkin lymphoma, immunostaining of classic Reed-Sternberg giant cells.



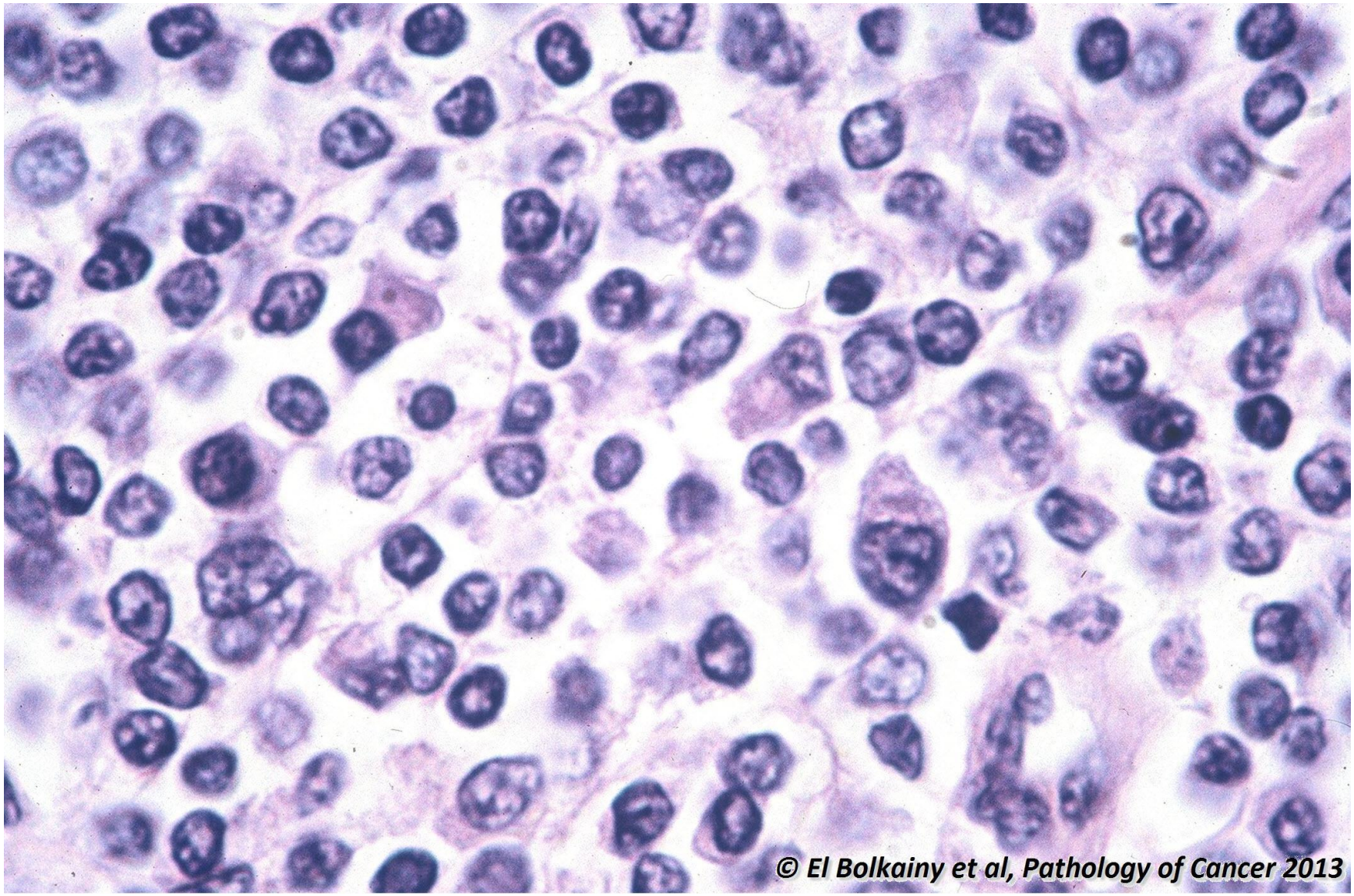
Picture 25-7 **Hodgkin lymphoma, immunostaining of classic Reed-Sternberg giant cells.** RS cells are positive for CD30, cytoplasmic membrane and paranuclear (Golgi) staining pattern. RS cells are also positive for CD15 and PAX-5.

25.8 Small lymphocytic NHL, histology.



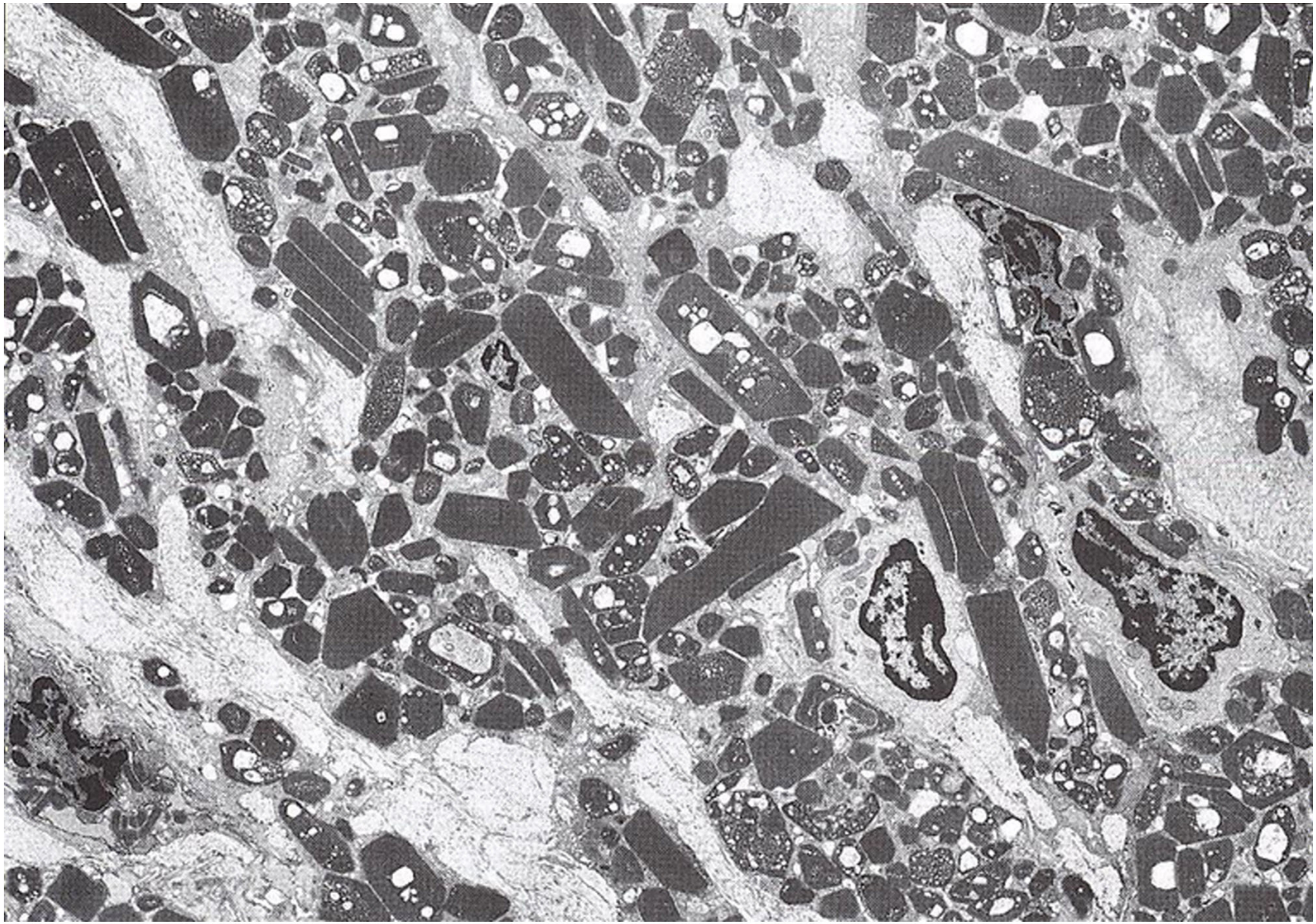
Picture 25-8 **Small lymphocytic NHL, histology. A** Lymph node, diffuse infiltrate of small round lymphocytes with dense chromatin. Immunostain:CD20+, CD5+, CD23+, Bcl-6-. **B** Liver, the lymphocytic infiltrate involves portal areas. There is associated (CLL) leukemia in 20% of cases.

25.9 Small lymphocytic lymphoma, plasmacytoid type, histology.



Picture 25-9 **Small lymphocytic lymphoma, plasmacytoid type, histology.** In addition to small lymphocytes, there are cells with eccentric dense nucleus of lymphocyte and eosinophilic cytoplasm, simulating a plasma cell (plasmacytoid cells). These cells are negative for CD38 and CD138.

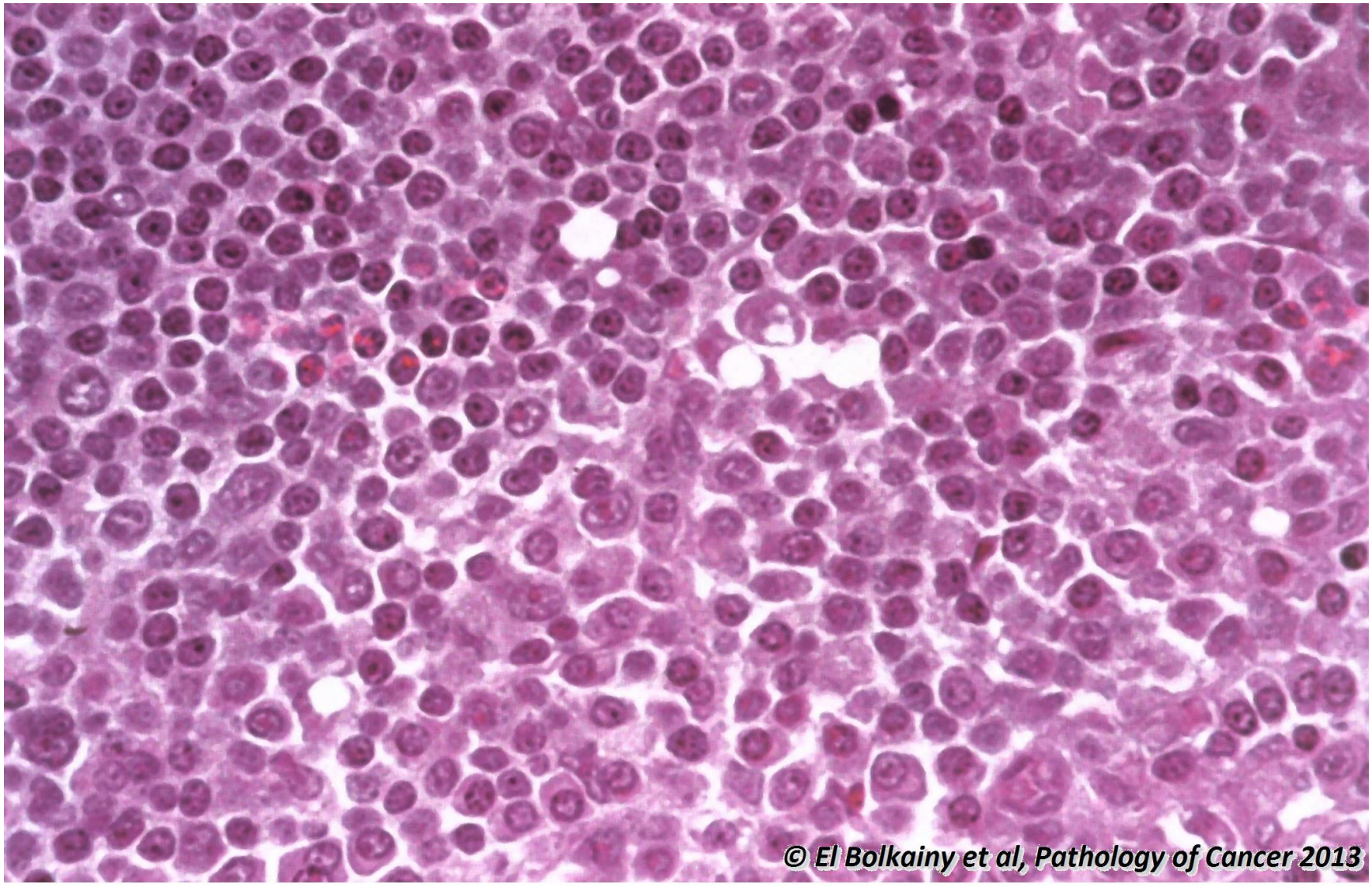
25.10 Lymphoplasmacytic lymphoma, electron microscopic features.



Picture 25-10

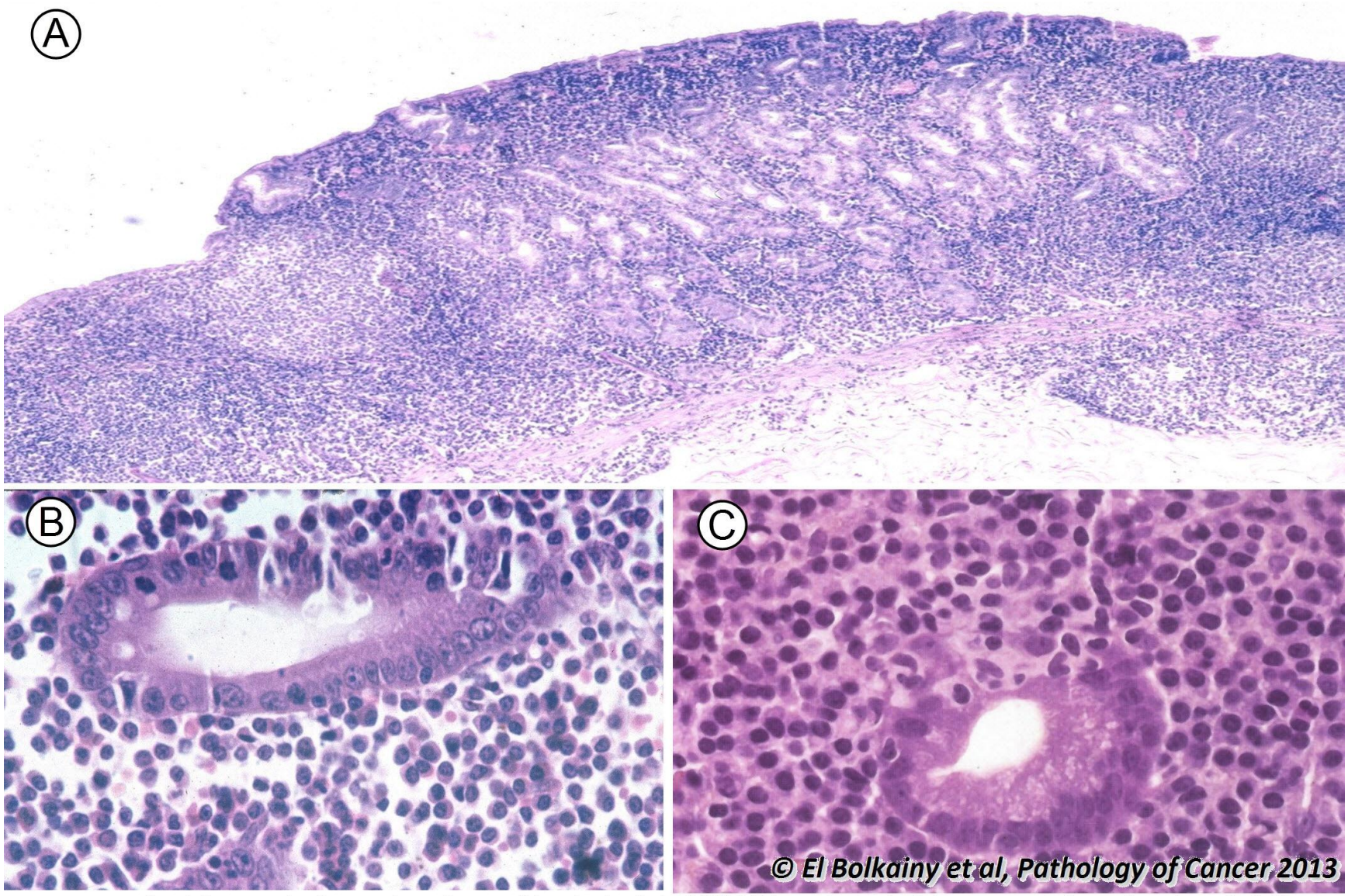
Lymphoplasmacytic lymphoma, electron microscopic features. The characteristic crystalline structure of immunoglobulin is found in the cytoplasm of plasma or phagocytosed in histiocytes. This confirms the true plasma cell component of the tumor. Additional confirmation is achieved by immunostains (CD38 and CD138 positivity).(Reproduced with permission, Fletcher CD, 2007).

25.11 Lymphoplasmacytic lymphoma, histology.



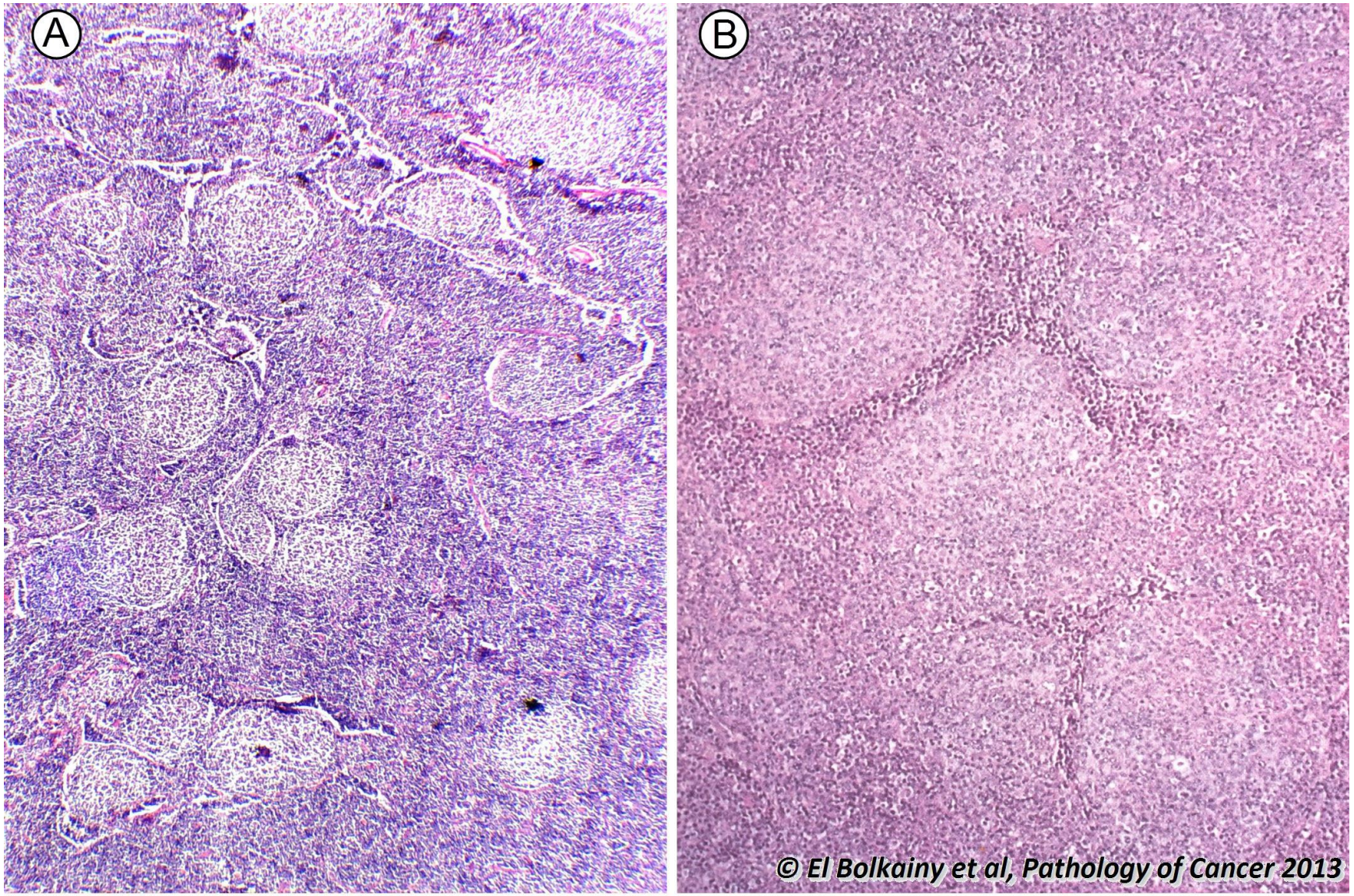
Picture 25-11 **Lymphoplasmacytic lymphoma, histology.** This is a biphasic lymphoma in which both lymphocytes and plasma cells are neoplastic (monoclonal). The latter may secrete immunoglobulin (usually IgM) in blood or stroma of tumor. When systemic symptoms are evident (blood hyperviscosity) and bone marrow involved, the condition is called Waldenstrom disease.

25.12 Gastric marginal zone lymphoma (H. pylori related MALT lymphoma).



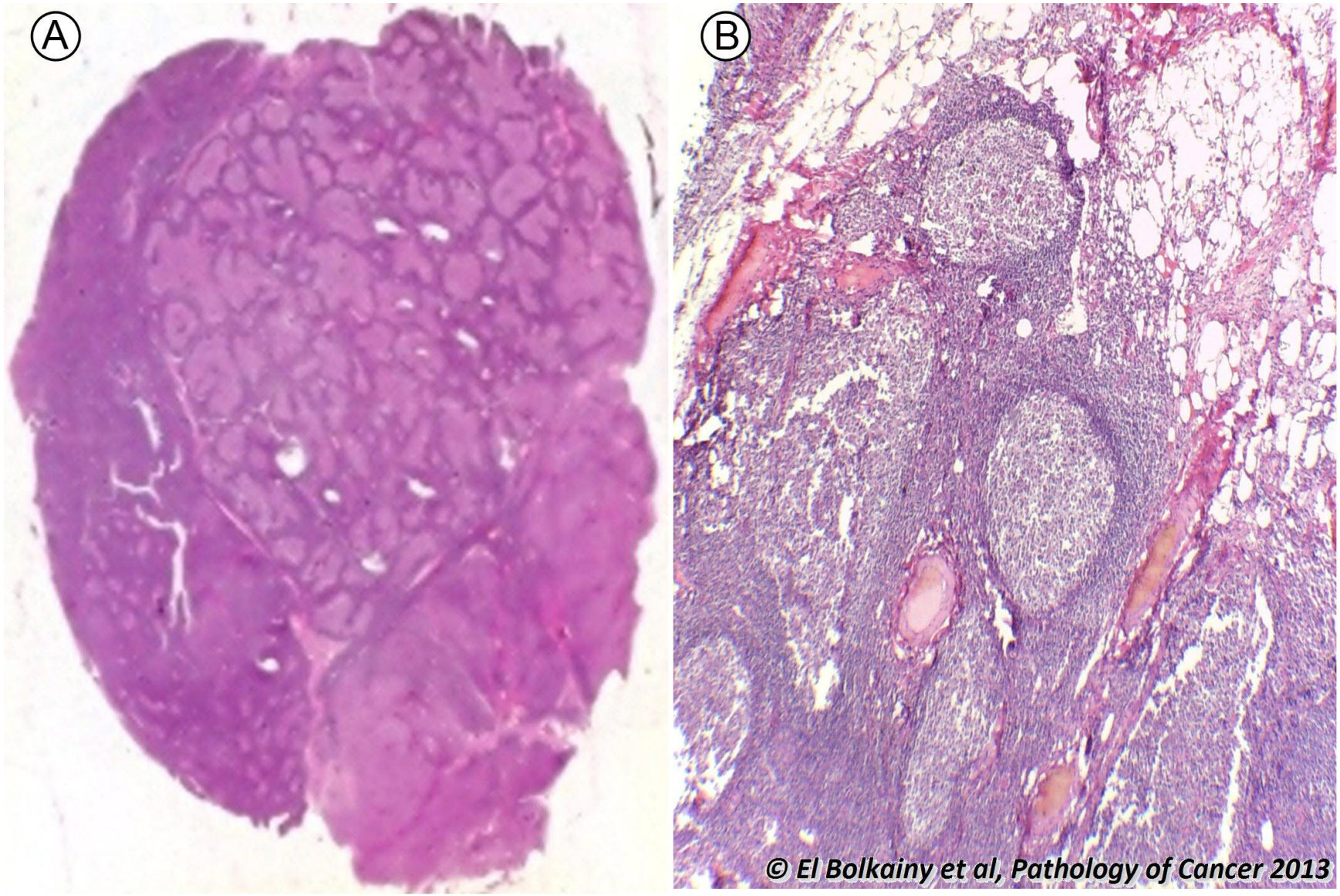
Picture 25-12 **Gastric marginal zone lymphoma (H.pylori related MALT lymphoma). A** Low power, dense lymphocytic infiltrate (CD20+) invading mucosa and muscularis mucosa. **B** and **C** High power, invasion of individual glands by the neoplastic lymphocytes (lymphoepithelial lesion). Immunostain: CD5-, CD23- , Bcl-6+ and MUM1+.

25.13 Follicular lymphoma, histology.



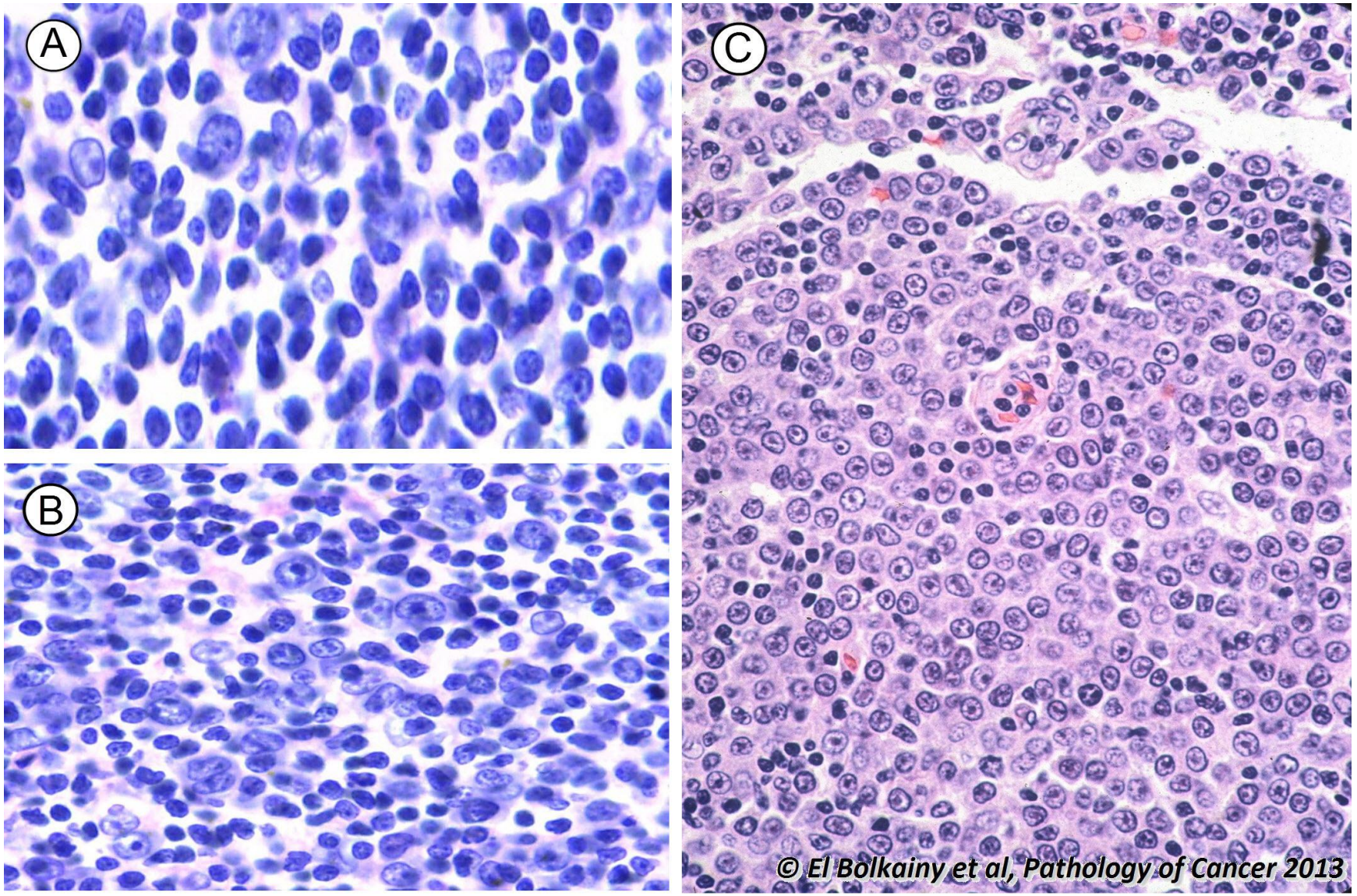
Picture 25-13 **Follicular lymphoma, histology. A** Low power, numerous, small crowded round follicles are evident. **B** High power, showing the characteristic back-to-back pattern. Immunostain CD20+ and Bcl-2+.

25.14 Follicular lymphoma.



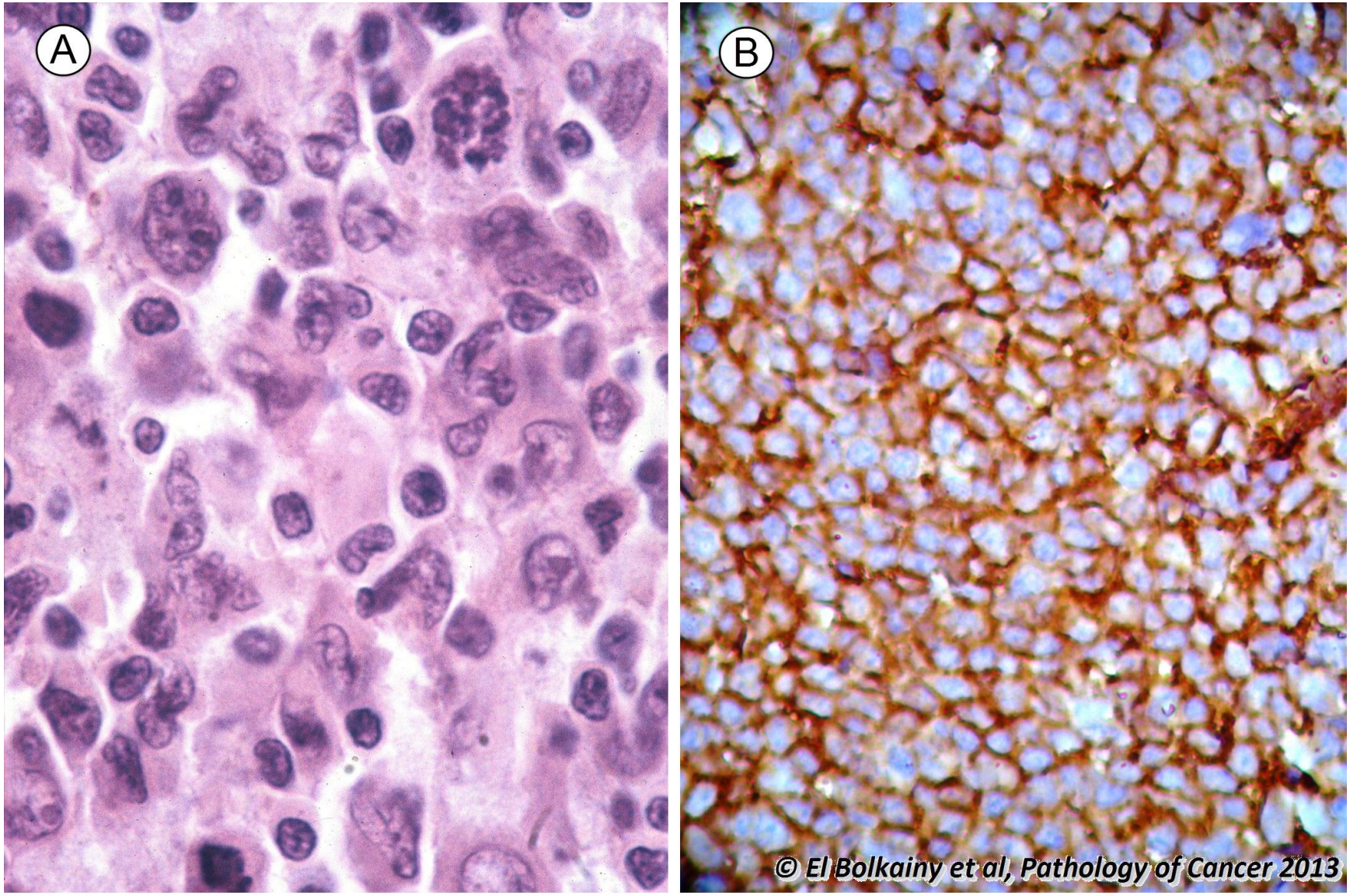
Picture 25-14 **Follicular lymphoma. A** Floral type. The follicles are irregular rather than rounded in shape. **B** Invasion of perinodal fat by follicles is diagnostic of follicular lymphoma.

25.15 Grading of follicular lymphoma.



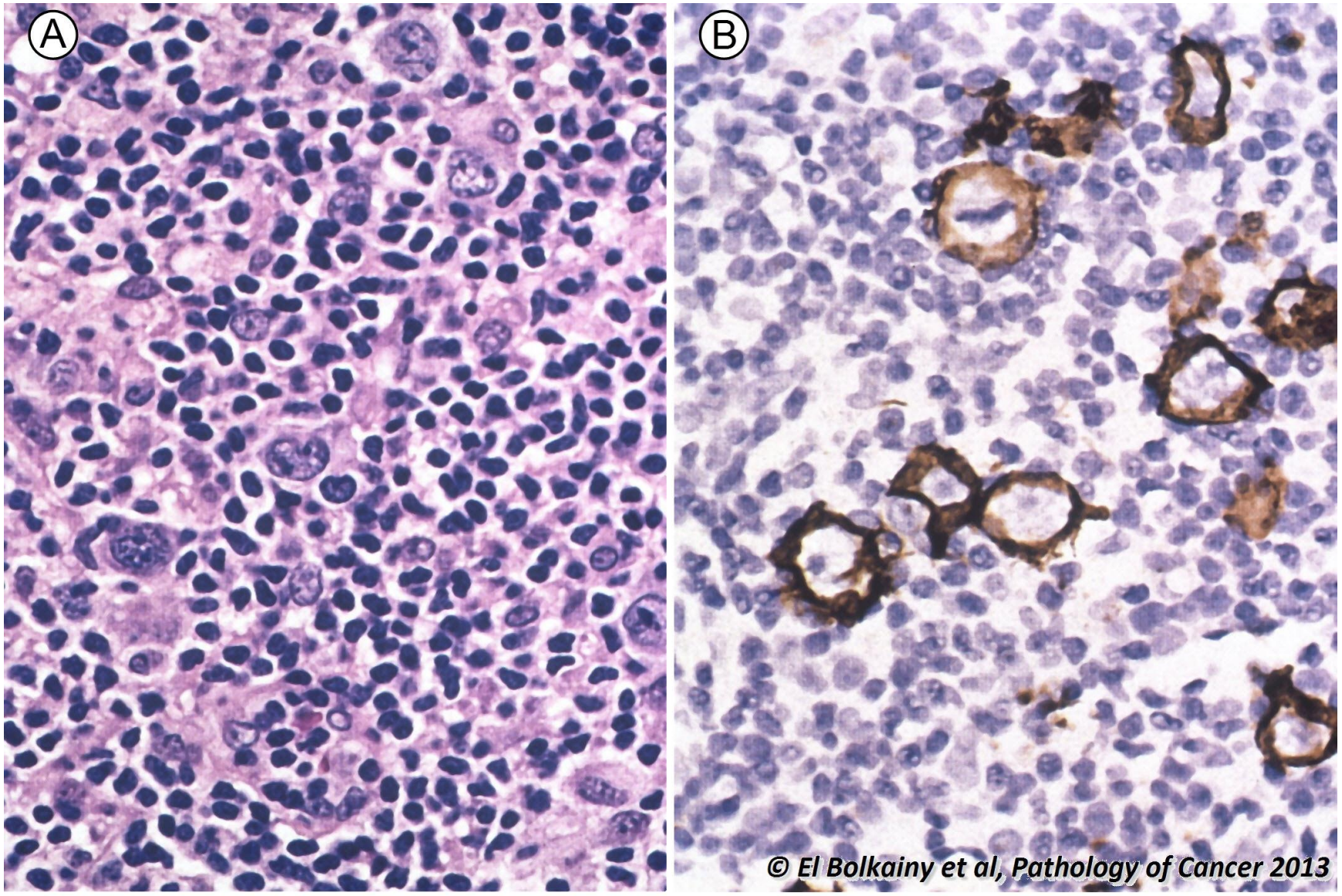
Picture 25-15 **Grading of follicular lymphoma. A** Grade 1, centroblasts < 6/HPF. **B** Grade 2, centroblasts 6-15/HPF. **C** Grade 3, centroblasts > 15/HPF. Diffuse pattern of centroblasts in follicles (grade 3b) or interfollicular area is considered diffuse large cell lymphoma and treated accordingly.

25.16 Diffuse large B-cell lymphoma (DLBCL).



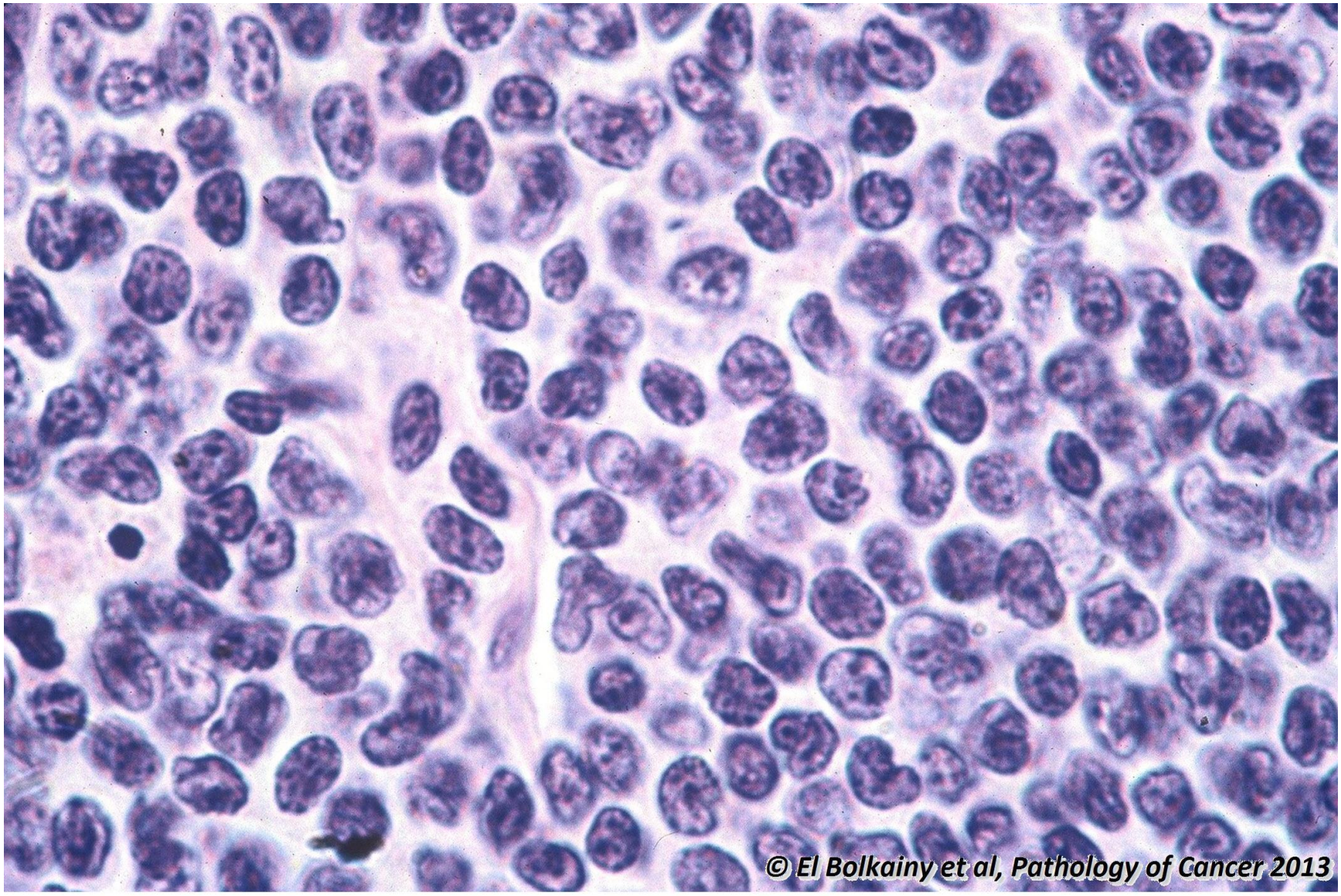
Picture 25-16 **Diffuse large B-cell lymphoma (DLBCL). A** Diffuse infiltrate of large lymphoid cells with clumped chromatin and evident nucleoli with cytoplasmic rim. **B** The cells show membranous immunoreactivity to CD20 (B-phenotype).

25.17 T-cell rich B-cell Non Hodgkin lymphoma.



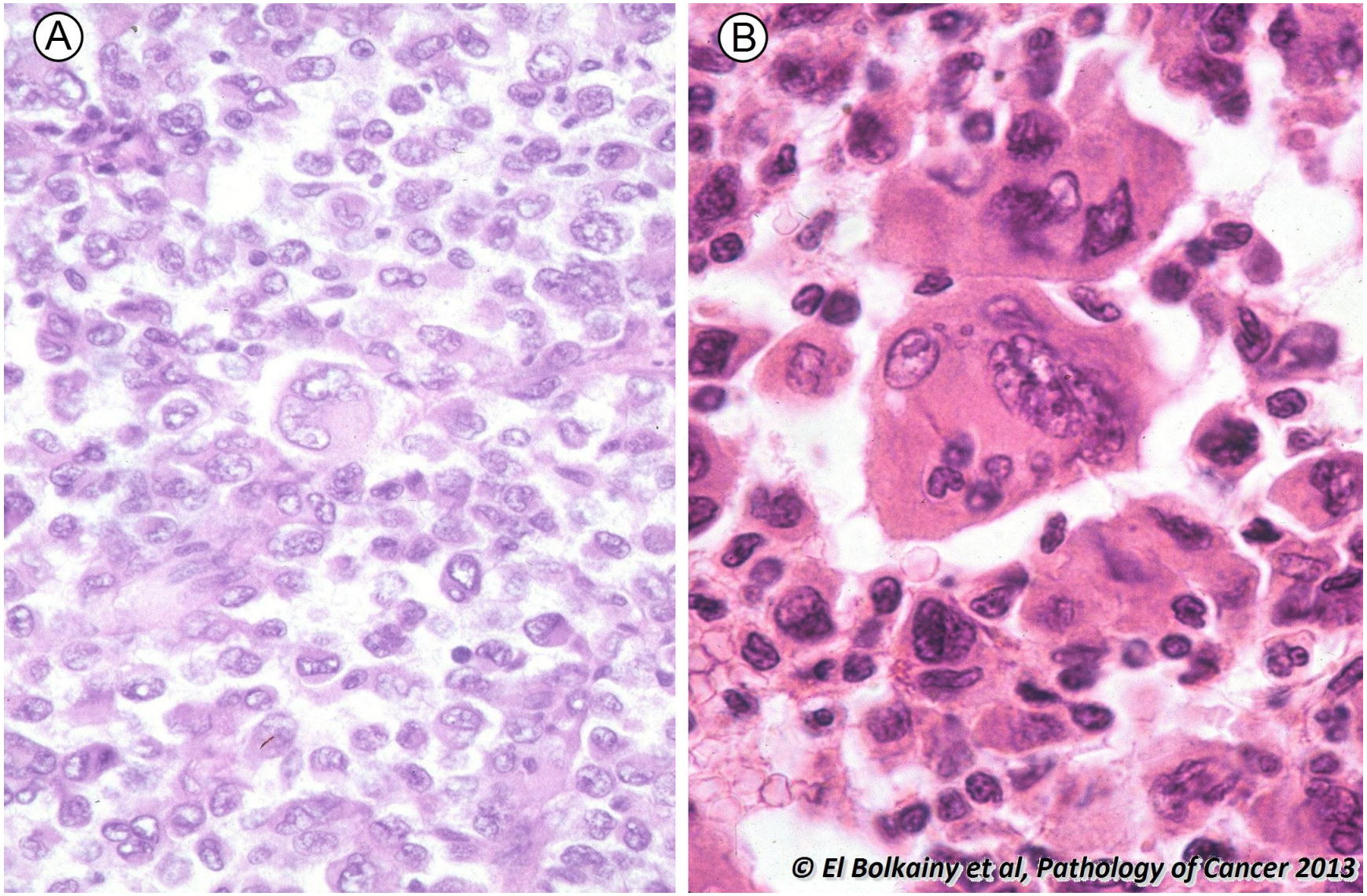
Picture 25-17 **T-cell rich B-cell Non Hodgkin lymphoma. A** Scattered large cells among small reactive lymphocytes. **B** Immunostain: the large cells are CD20+, but, small lymphocytes are T-phenotype (CD3+).

25.18 Mantle cell lymphoma, histology.



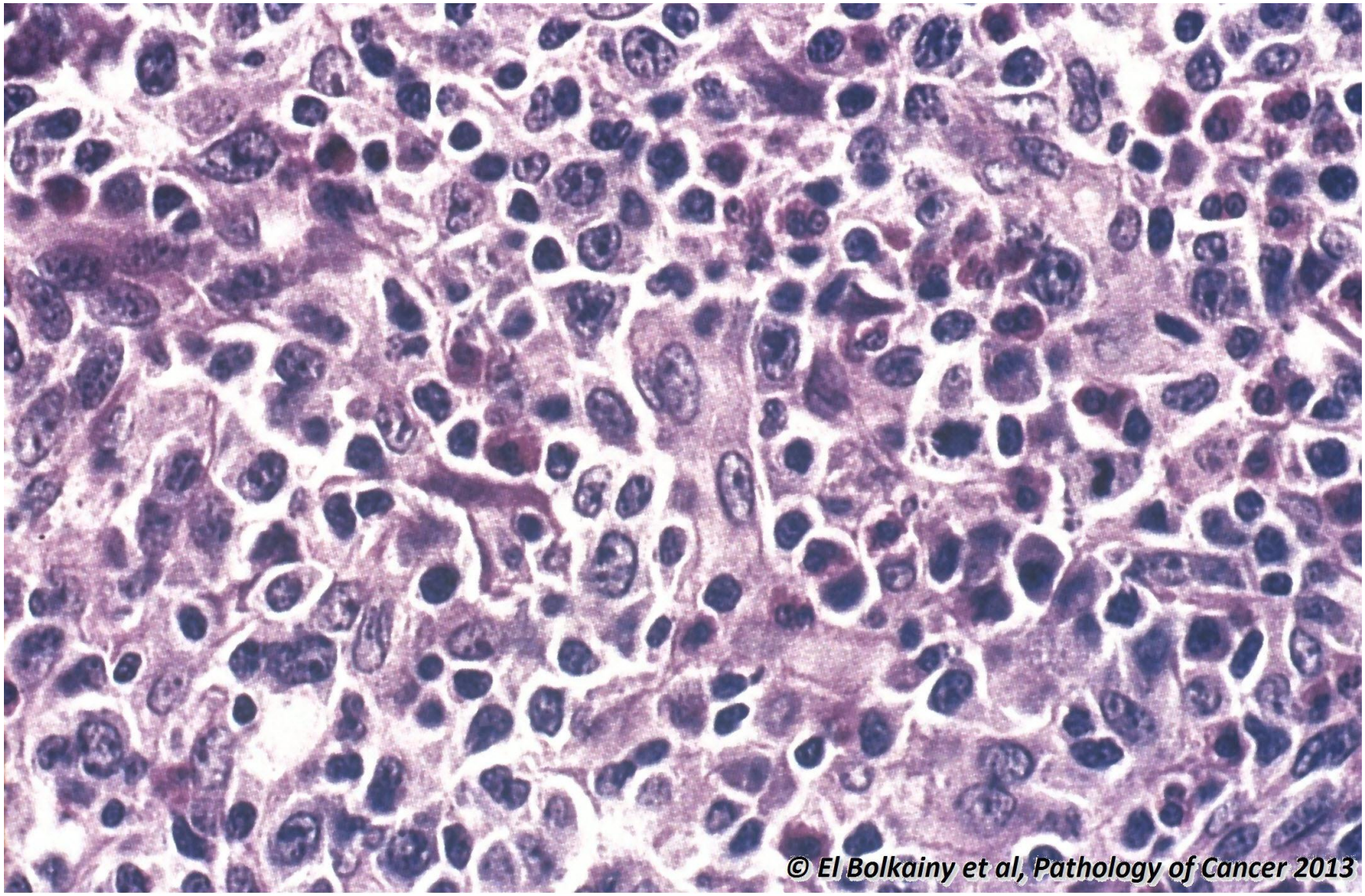
Picture 25-18 **Mantle cell lymphoma, histology.** The lymphocytes are small, irregular (indented or kidney-shaped). Immunostain: CD5+, CD23-, cyclin D1+.

25.19 Anaplastic large cell lymphoma, histology.



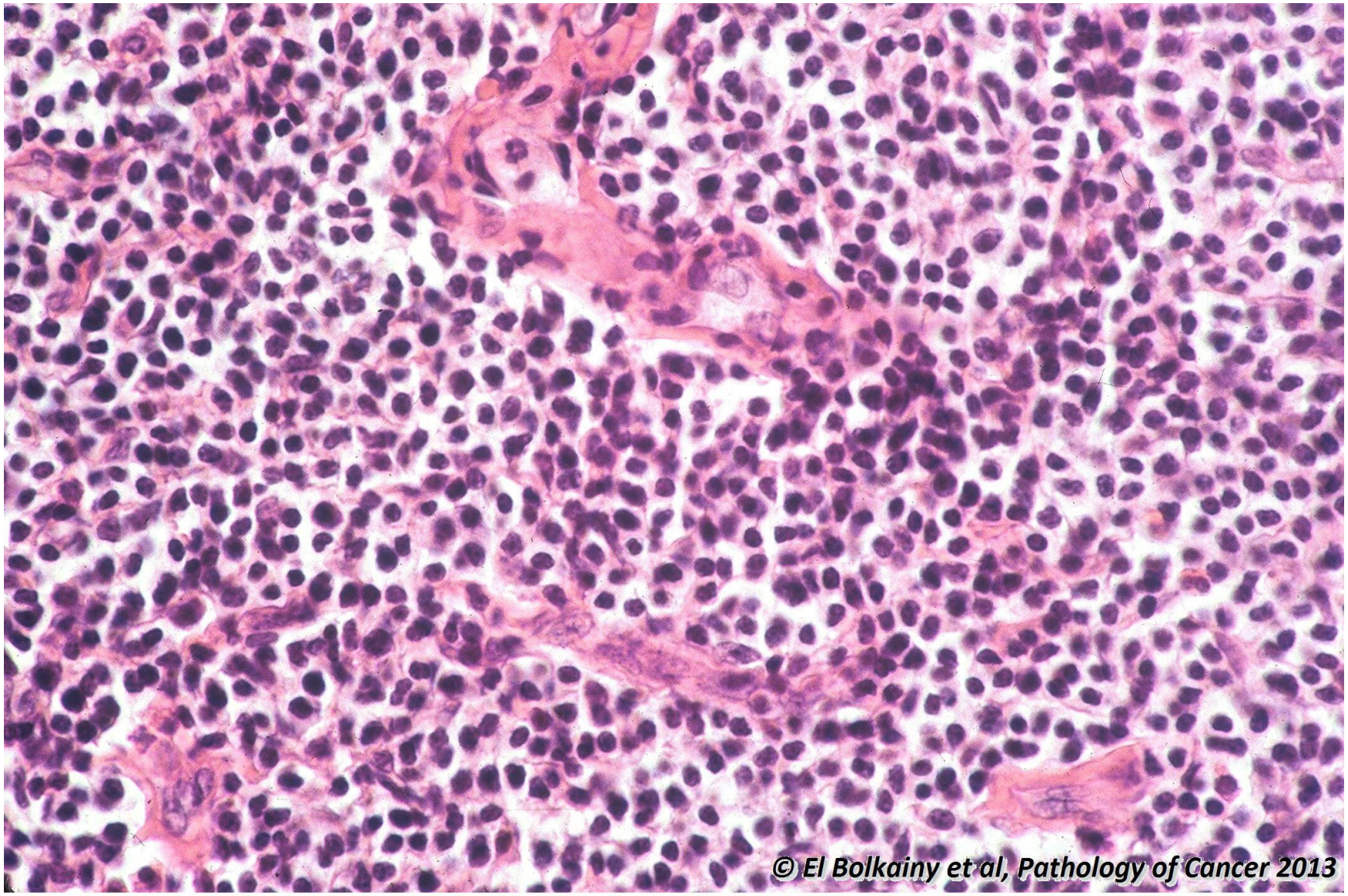
Picture 25-19 **Anaplastic large cell lymphoma, histology. A** Pleomorphic cellular infiltrate commonly involve sinuses. **B** Giant cells have multiple nuclei with horse-shoe pattern. Immunostain CD30+ (100%), CD3+ (85%) and ALK-1 (75%). ALK-negative tumors have unfavorable prognosis.

25.20 Peripheral T-cell NHL, histology.



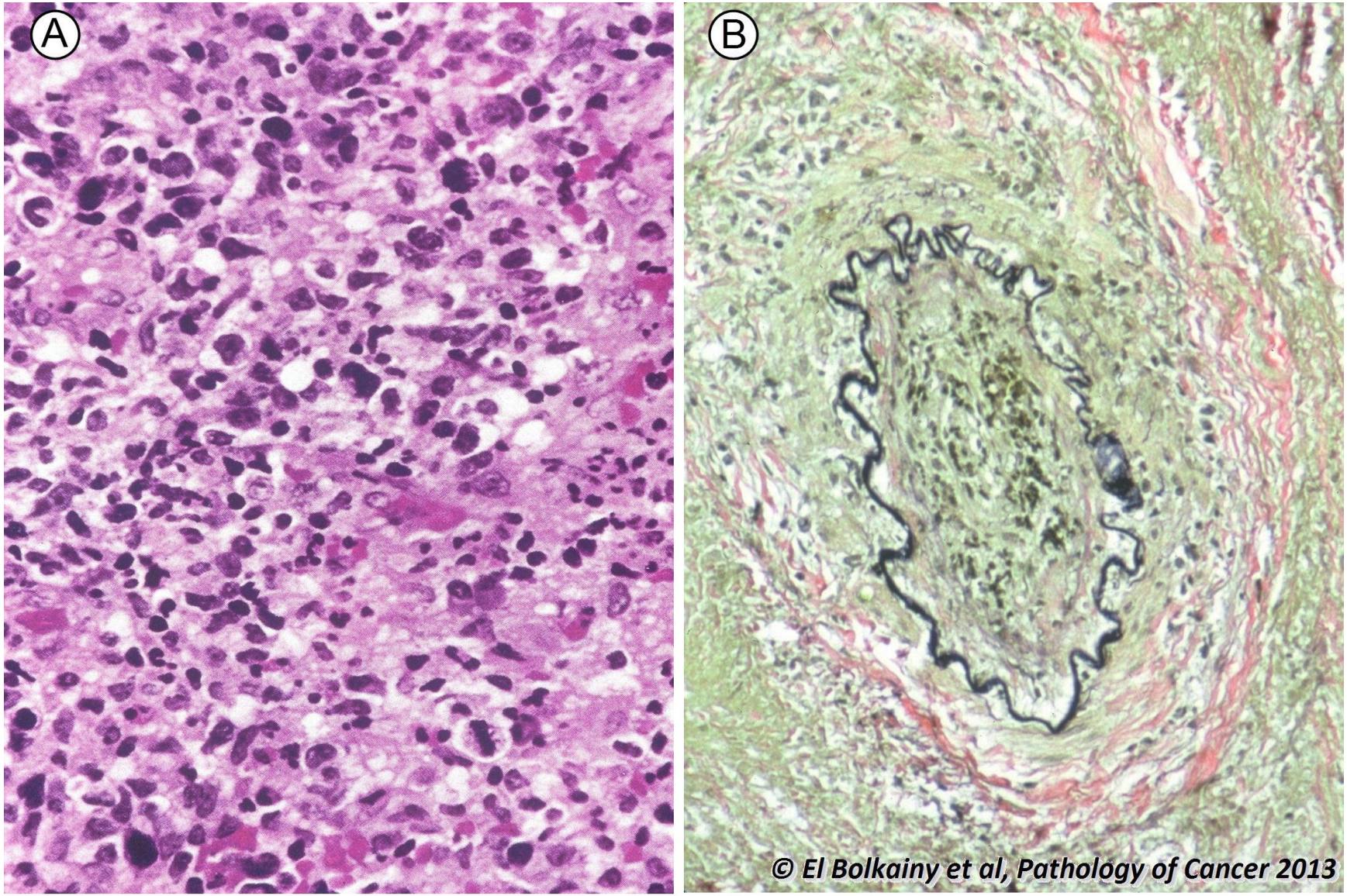
Picture 25-20 **Peripheral T-cell NHL, histology.** A mixed population of small and large lymphocytes with irregular shape. Associated vascular proliferations, eosinophils and histiocytes are characteristic. Immunostain CD3+.

25.21 Angioimmunoblastic lymphoma.



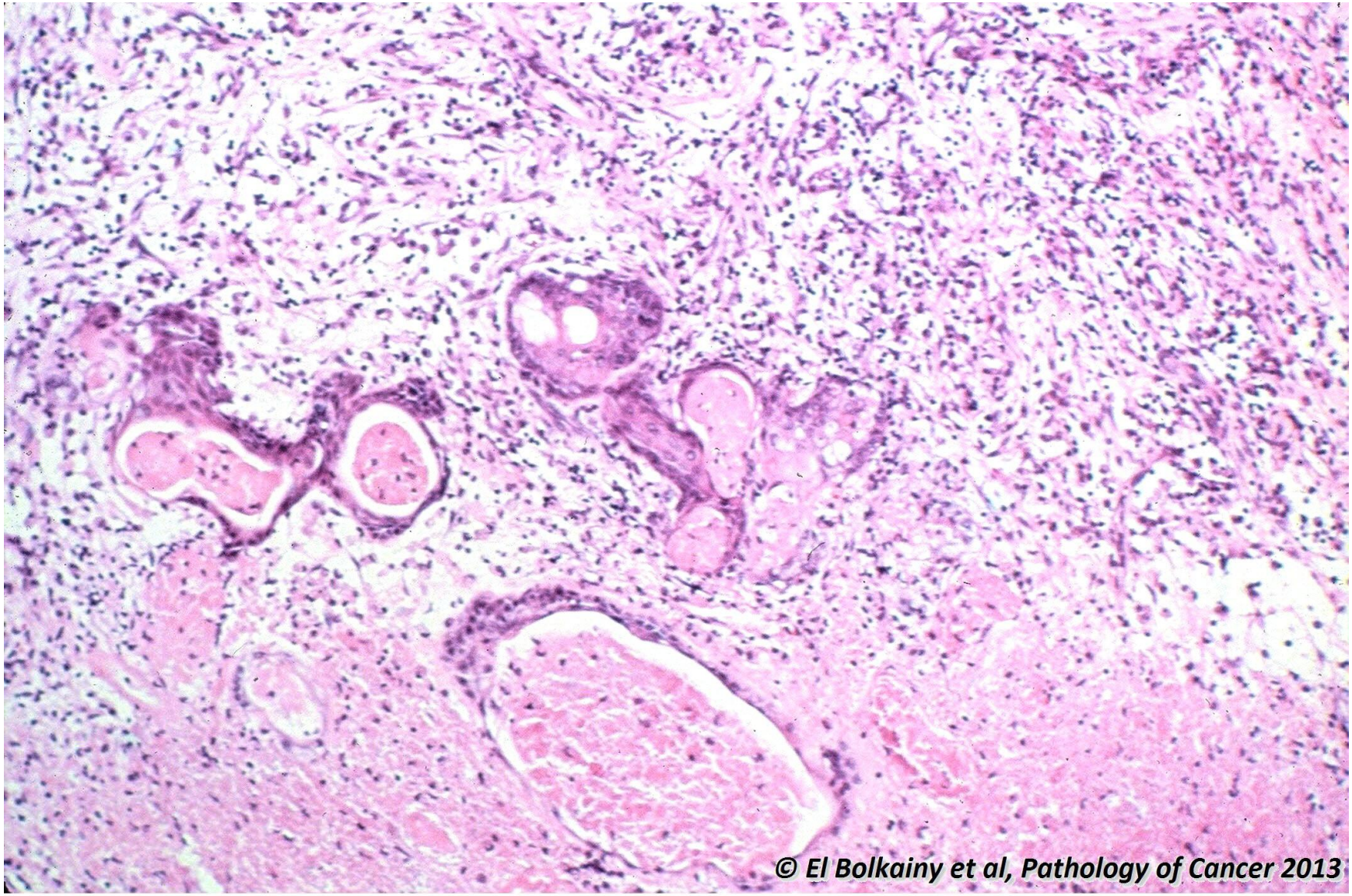
Picture 25-21 **Angioimmunoblastic lymphoma.** This uncommon variant of T-cell lymphoma (15%) is characterized by polymorphic infiltrate of monoclonal lymphocytes, polyclonal plasma cells, scattered immunoblasts, and prominent arborizing vascular proliferation.

25.22 Extranodal NK/T-cell lymphoma, nasal type (formerly angiocentric lymphoma).



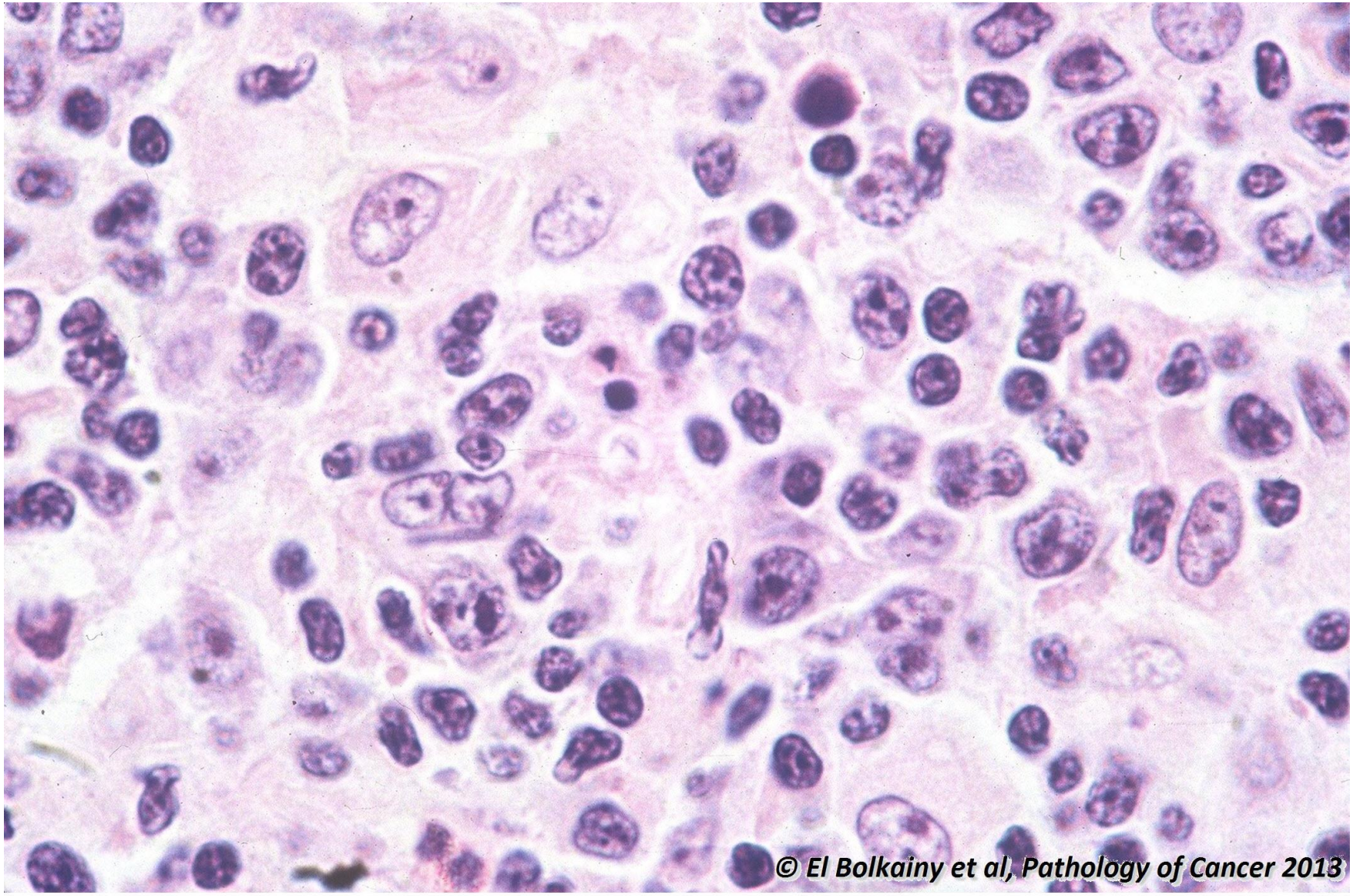
Picture 25-22 **Extranodal NK/T-cell lymphoma, nasal type (formely angiocentric lymphoma).** A rare T-cell variant characterized by: **A** A mixed cell infiltrate (CD56+, CD3+) with focal necrosis. **B** Invasion of wall of blood vessels.

25.23 Extranodal NK/T -cell lymphoma, nasal type.



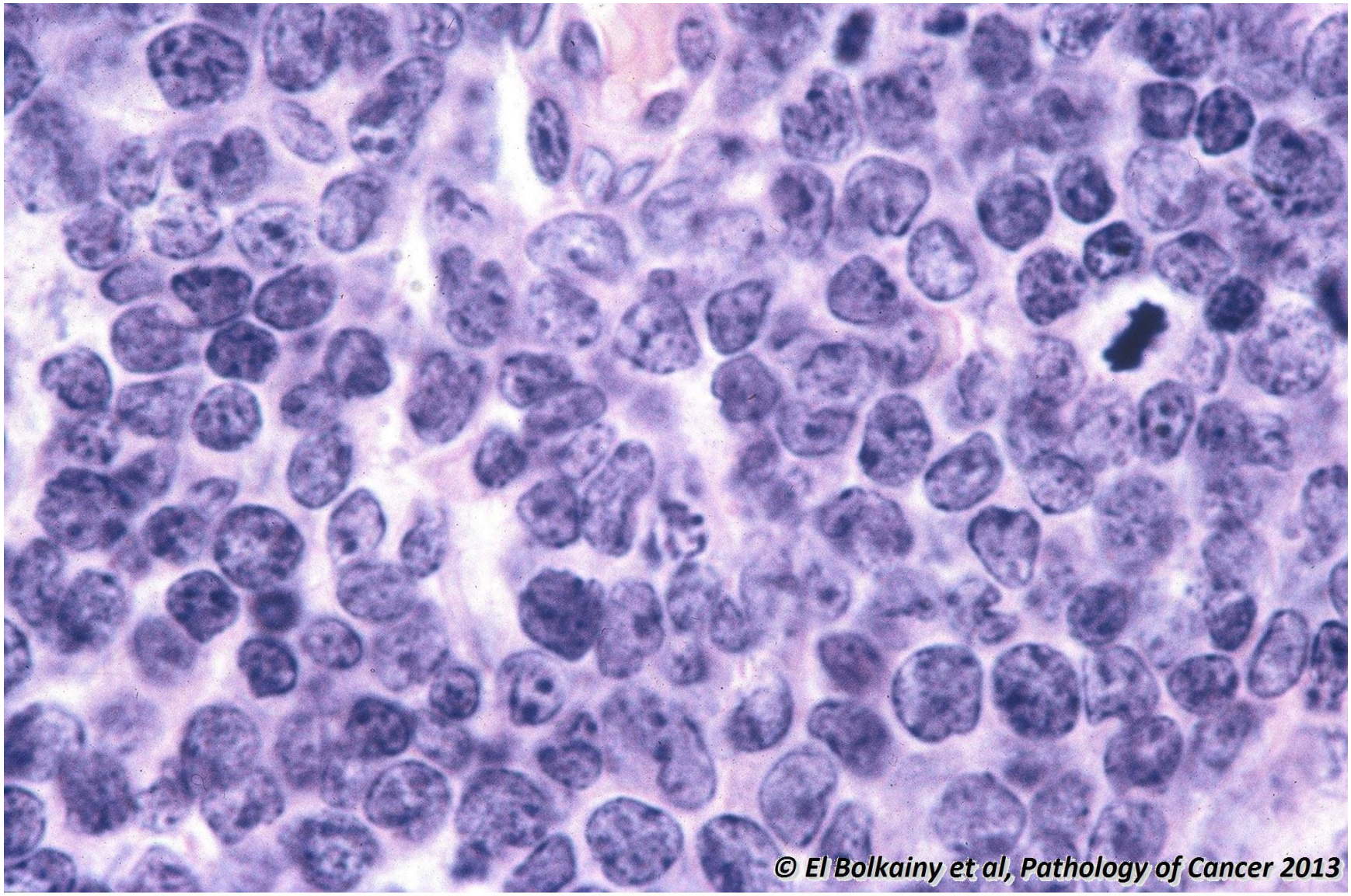
Picture 25-23 **Extranodal NK/T-cell lymphoma, nasal type.** Note areas of fibrinoid necrosis and pseudoepitheliomatous hyperplasia of surface nasal epithelium.

25.24 Epithelioid cell rich T-cell lymphoma (Lennert's type).



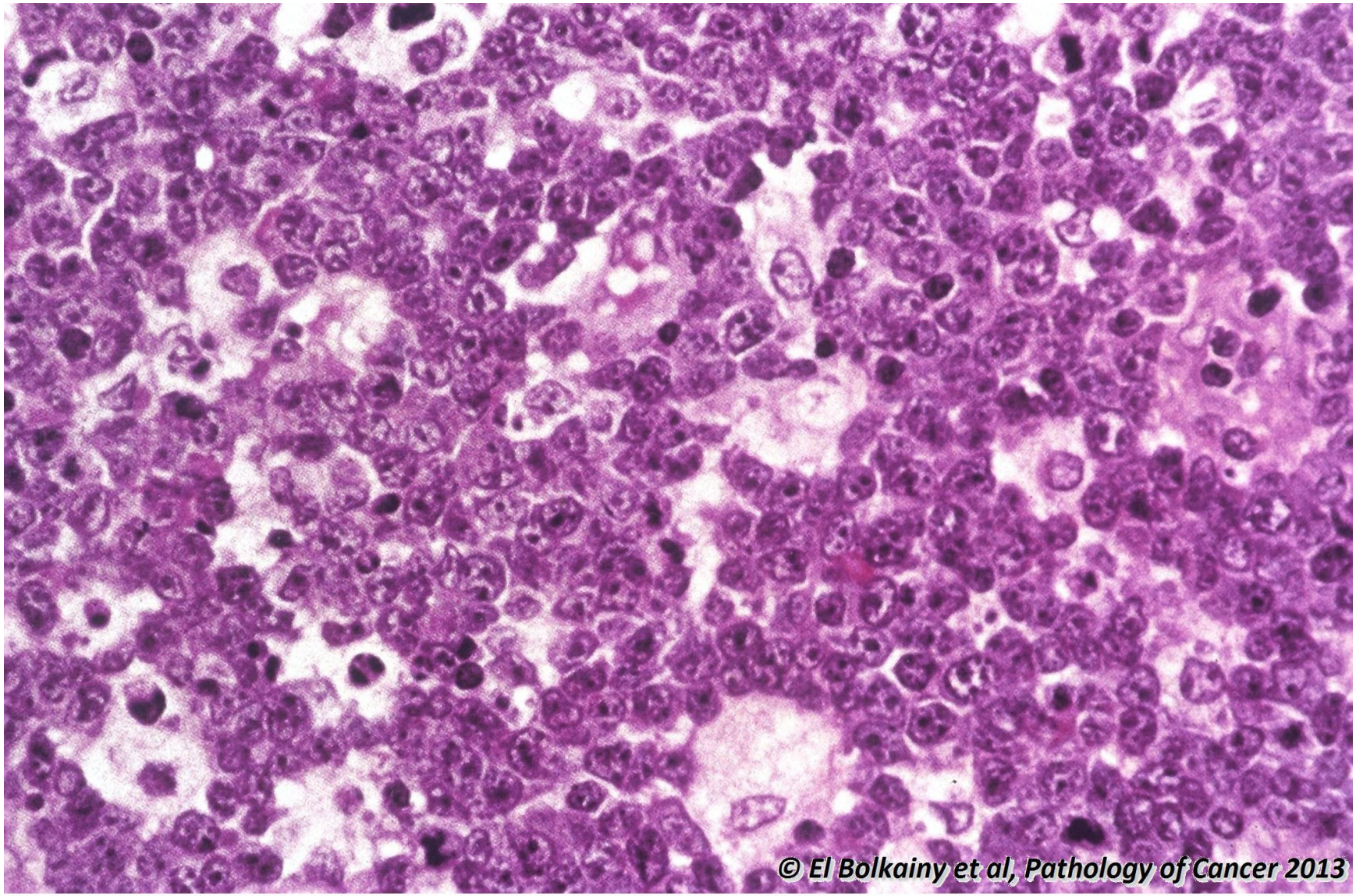
Picture 25-24 **Epithelioid cell rich T-cell lymphoma (Lennert type).** A mixed population of large and small neoplastic lymphocytes, associated with scattered epithelioid histiocytes.

25.25 Lymphoblastic lymphoma, histology.



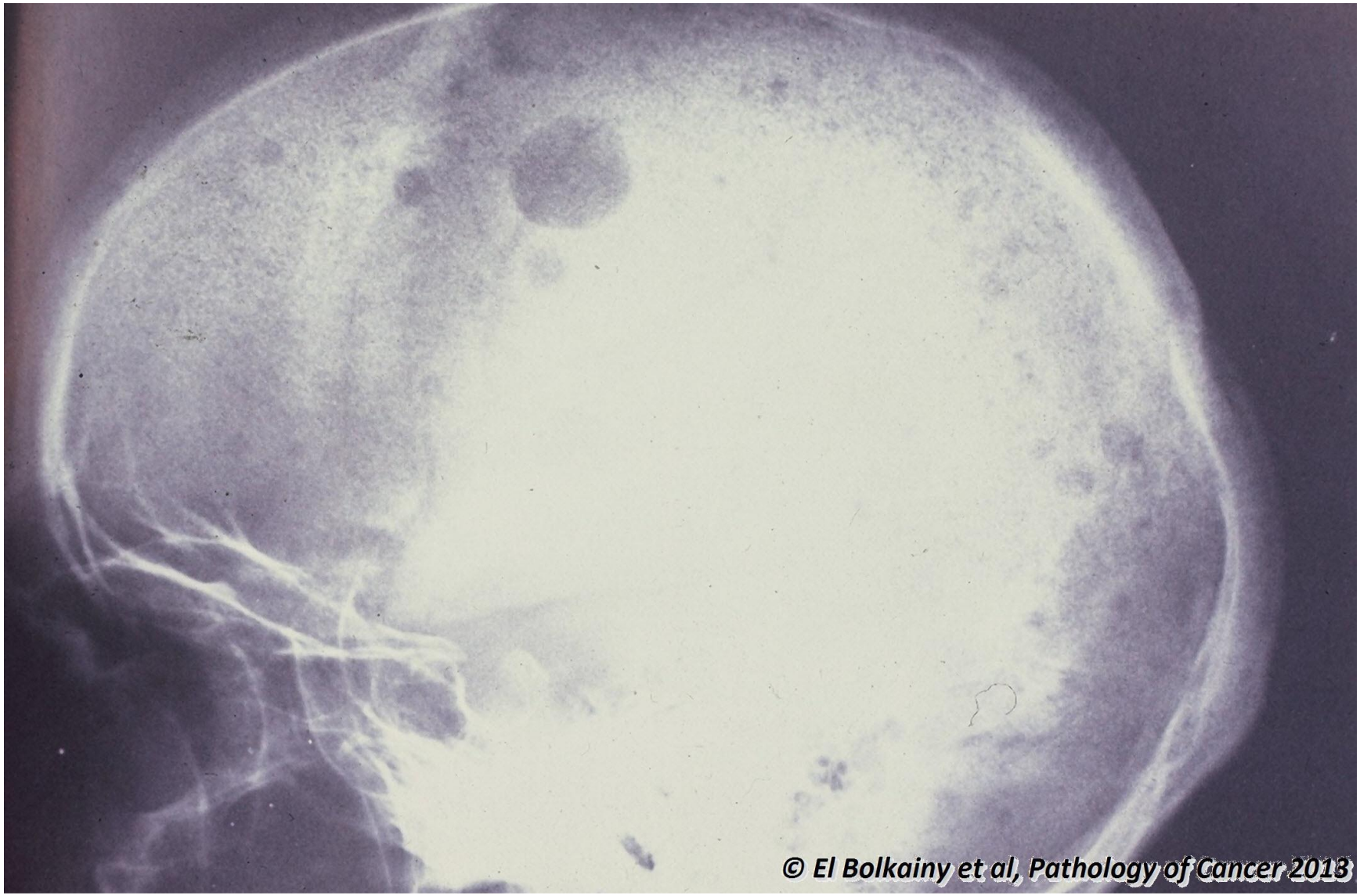
Picture 25-25 **Lymphoblastic lymphoma, histology.** Diffuse infiltrate of intermediate size lymphoblasts with blastoid features (fine dispersed chromatin and indistinct nuclei), streaming pattern. Immunostain: CD3+ (85%), CD20+ (15%) and TdT+.

25.26 Burkitt lymphoma, histology.



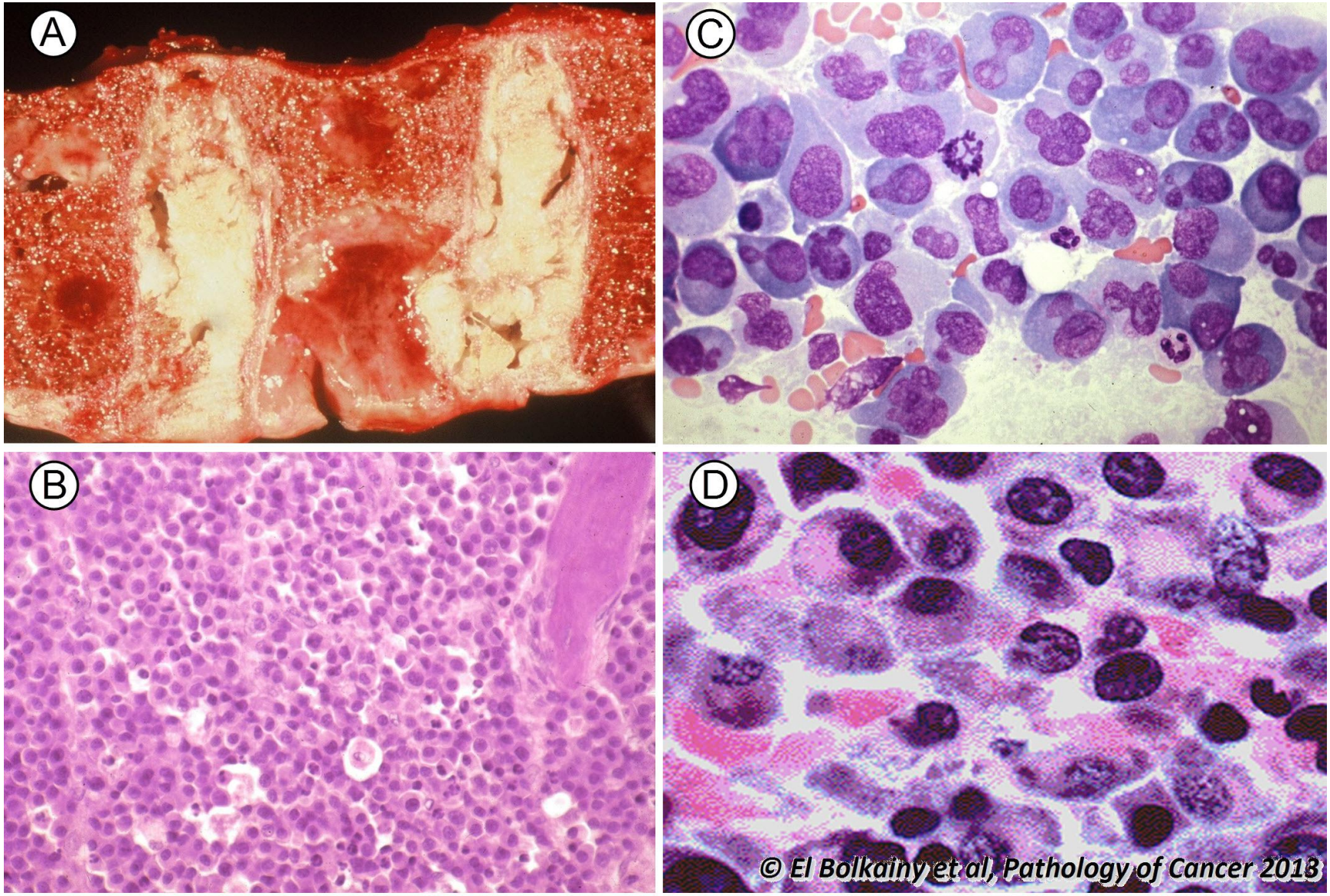
Picture 25-26 **Burkitt lymphoma, histology.** Tumor cells are of medium size, nuclei with clumpy chromatin and multiple nucleoli, active mitosis, marked appoptosis and scattered histiocytes (starry sky). Immunostain: CD20+, CD10+, bcl-6+, TdT-, Ki-67 positive in almost 100% of cells.

25.27 Multiple myeloma, radiographic features.



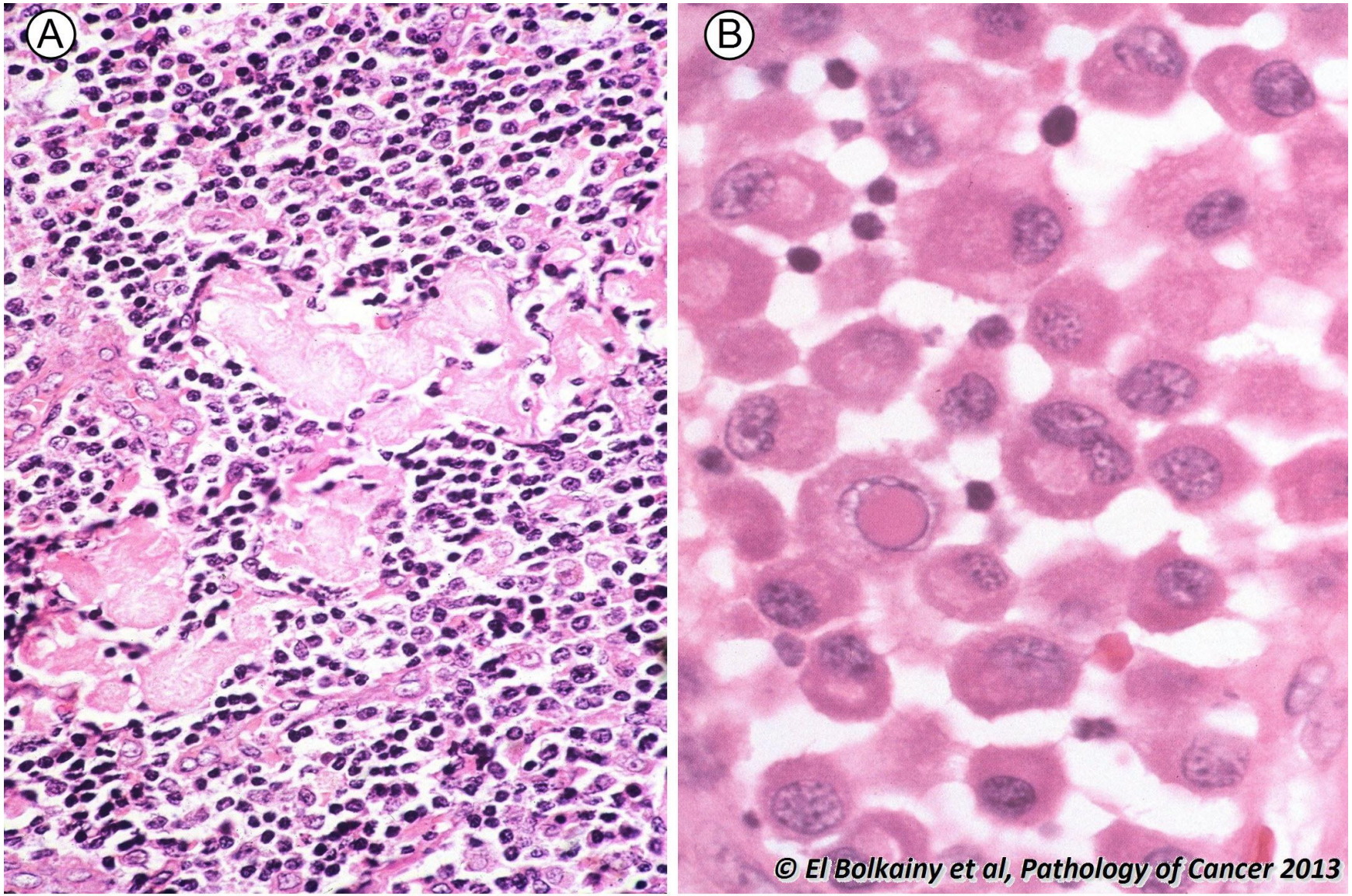
Picture 25-27 **Multiple myeloma, radiographic features.** Multiple well-defined (punched out) osteolytic defects. Axial bone (skull, vertebral column and pelvis) are mainly affected.

25.28 Multiple myeloma (MM).



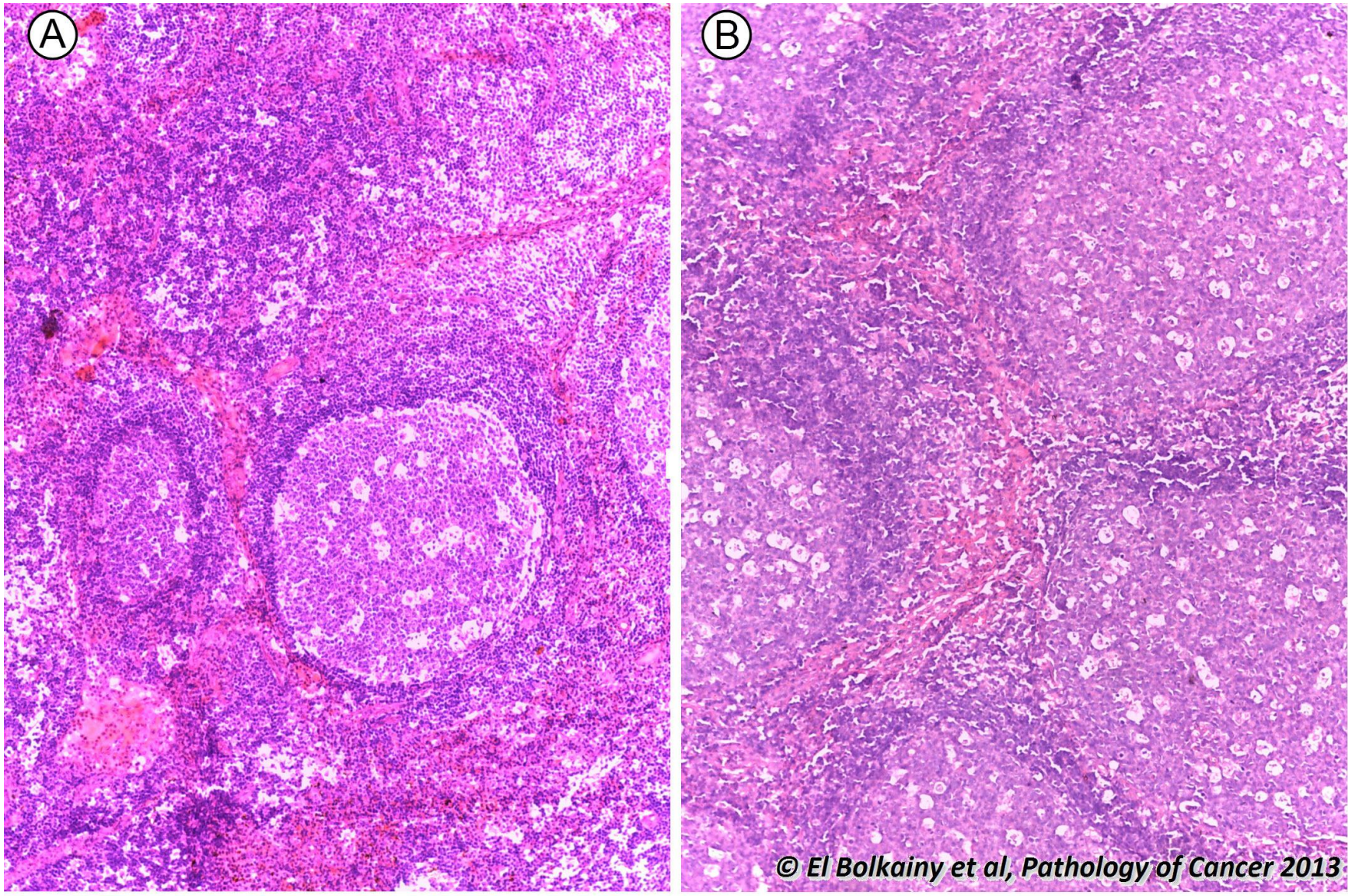
Picture 25-28 **Multiple myeloma (MM). A** Multiple defects in vertebral column. **B** Well differentiated MM, a pure dense population of plasma cells, H&E stain. **C** Giemsa stain, atypical binucleated plasma cells and mitotic figure. **D** Anaplastic MM showing pleomorphic plasmablasts. Immunostain: CD38+, CD138+, PAX-5+.

25.29 Lymphoplasmacytic lymphoma, secretory, histology.



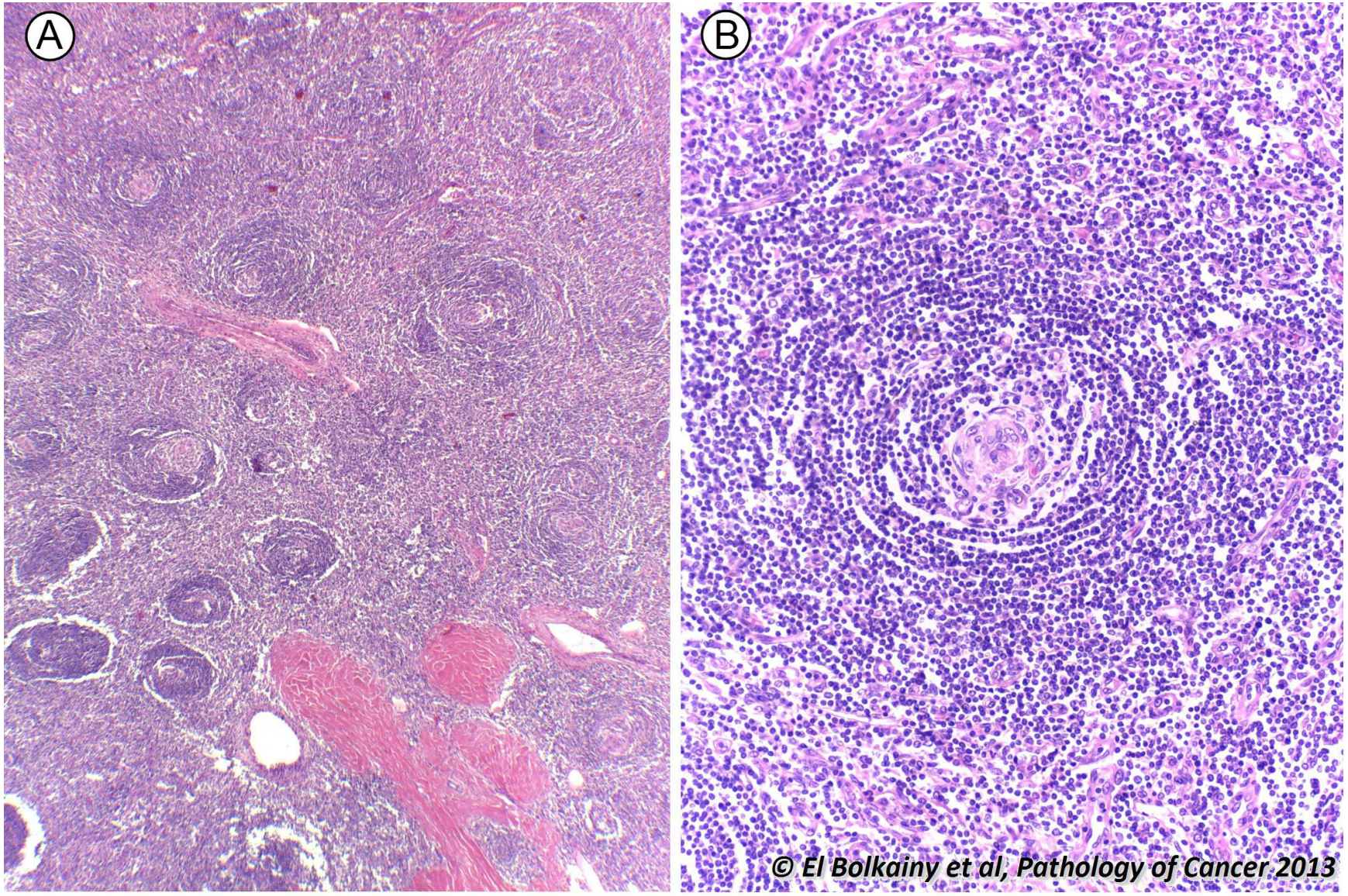
Picture 25-29 **Lymphoplasmacytic lymphoma, secretory, histology. A** There is clonal proliferation of both lymphocytes and plasma cells, with immunoglobulin deposits in the stroma. **B** Cytoplasmic immunoglobulin inclusions in plasma cells (Russel bodies) are evident. Also intranuclear inclusions may be seen (Dutcher bodies).

25.30 Follicular reactive hyperplasia of lymph node.



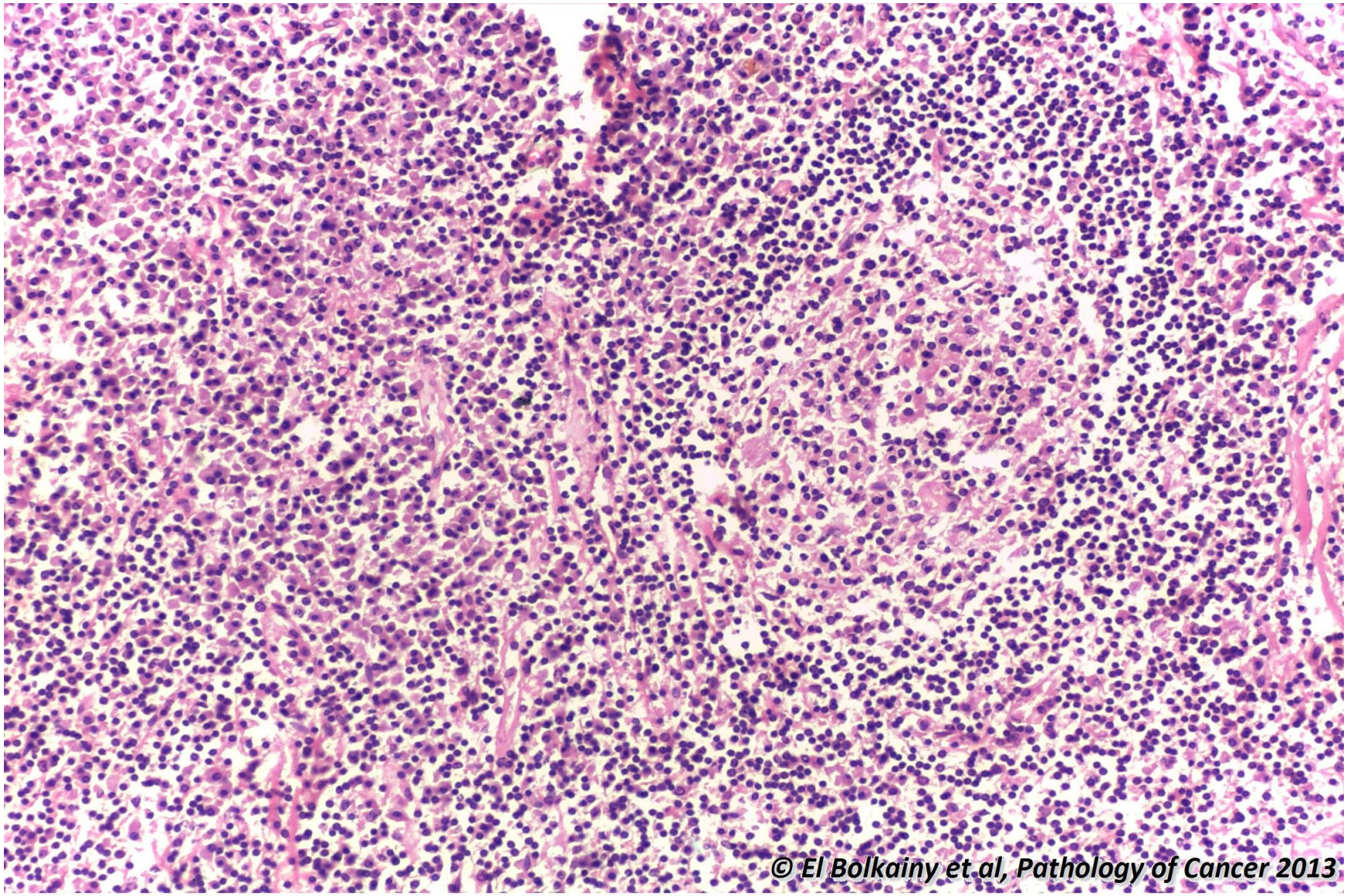
Picture 25-30 **Follicular reactive hyperplasia of lymph node. A** and **B** The follicles are widely apart, variable in size, with intact mantle zone, rich in large cells and contain phagocytic histiocytes. Immunostaining: Follicles are CD10 +, Bcl-2 negative, and show high Ki-67 index (65%).

25.31 Castleman disease, hyaline vascular type, the most common (90%).



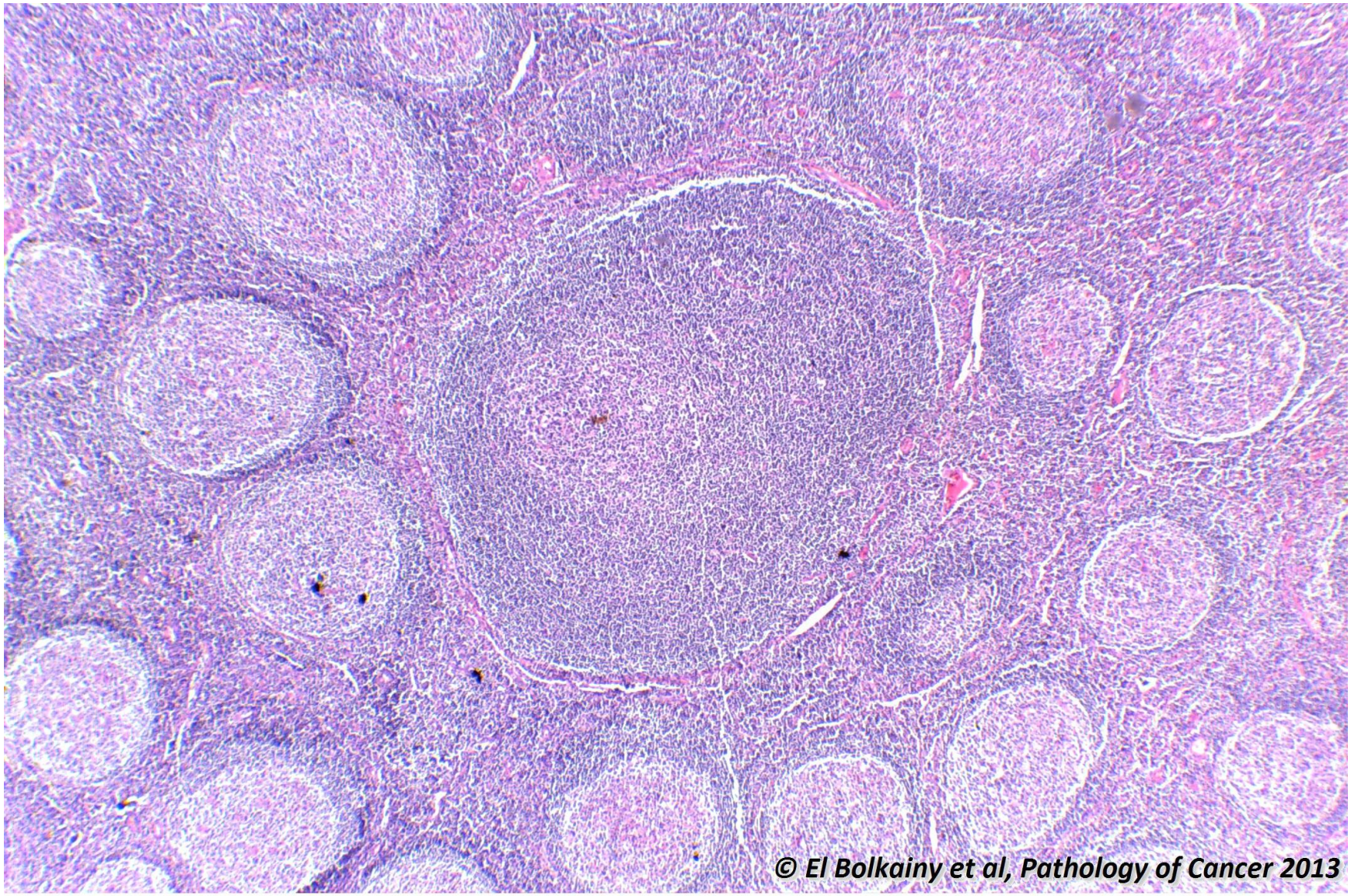
Picture 25-31 **Castleman disease, hyaline vascular type, the most common (90%). A** Low power, note regressed germinal centers, fibrovascular bands in paracortex with lack of sinuses. **B** High power, atrophic vascular germinal center and expanded mantle zone with onion rings pattern. Immunostain: follicles (CD20+) and interfollicular areas (CD3+). Rarely, there is a mild risk to progress to NHL.

25.32 Castleman disease, plasma cell type.



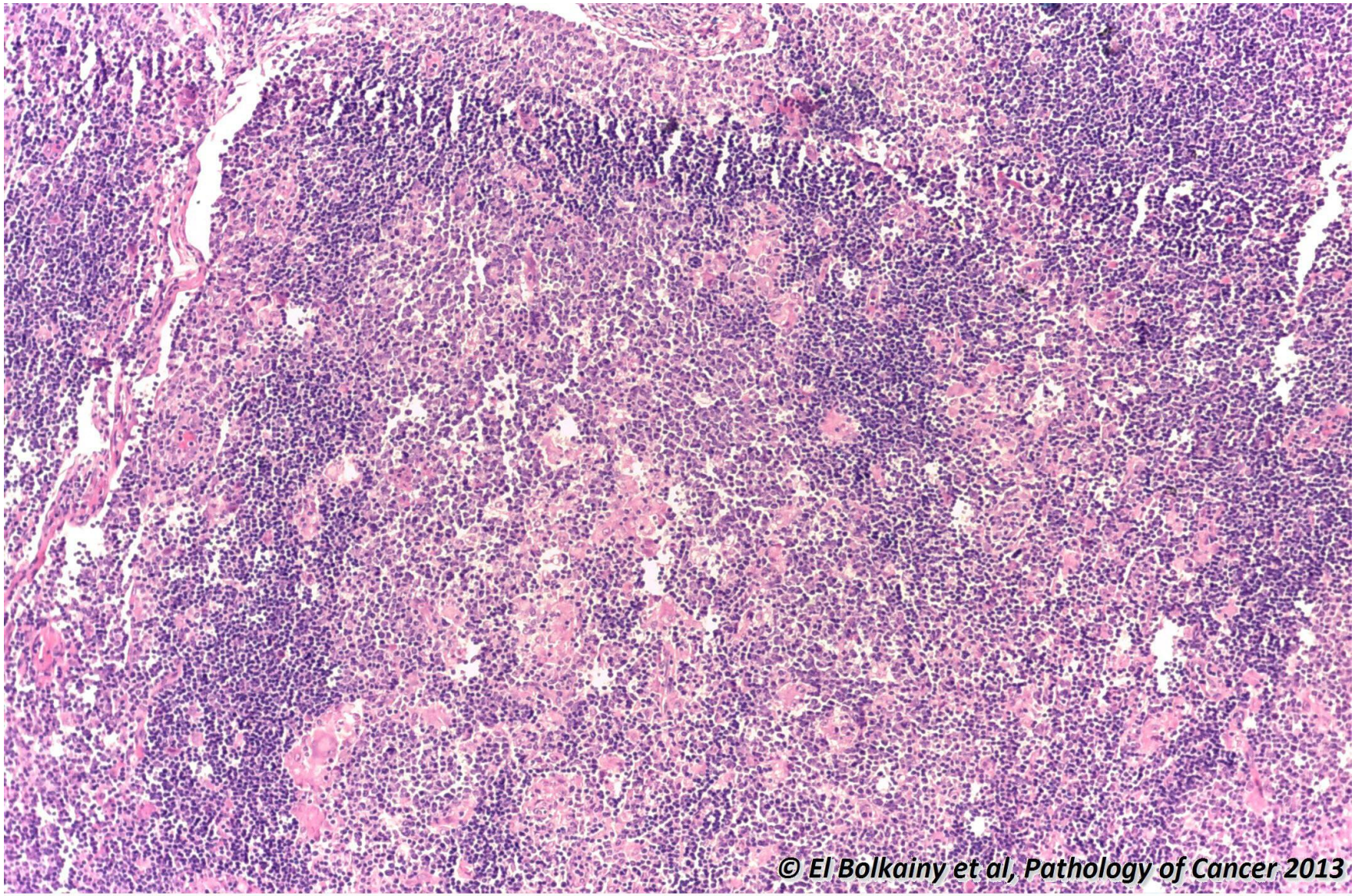
Picture 25-32 **Castleman disease, plasma cell type.** A less common type (10%). There is diffuse expansion of interfollicular areas and paracortex by plasma cells, as well as, lymphocytes. It may be associated with HHV-8 virus and systemic symptoms.

25.33 Progressive transformation of germinal center.



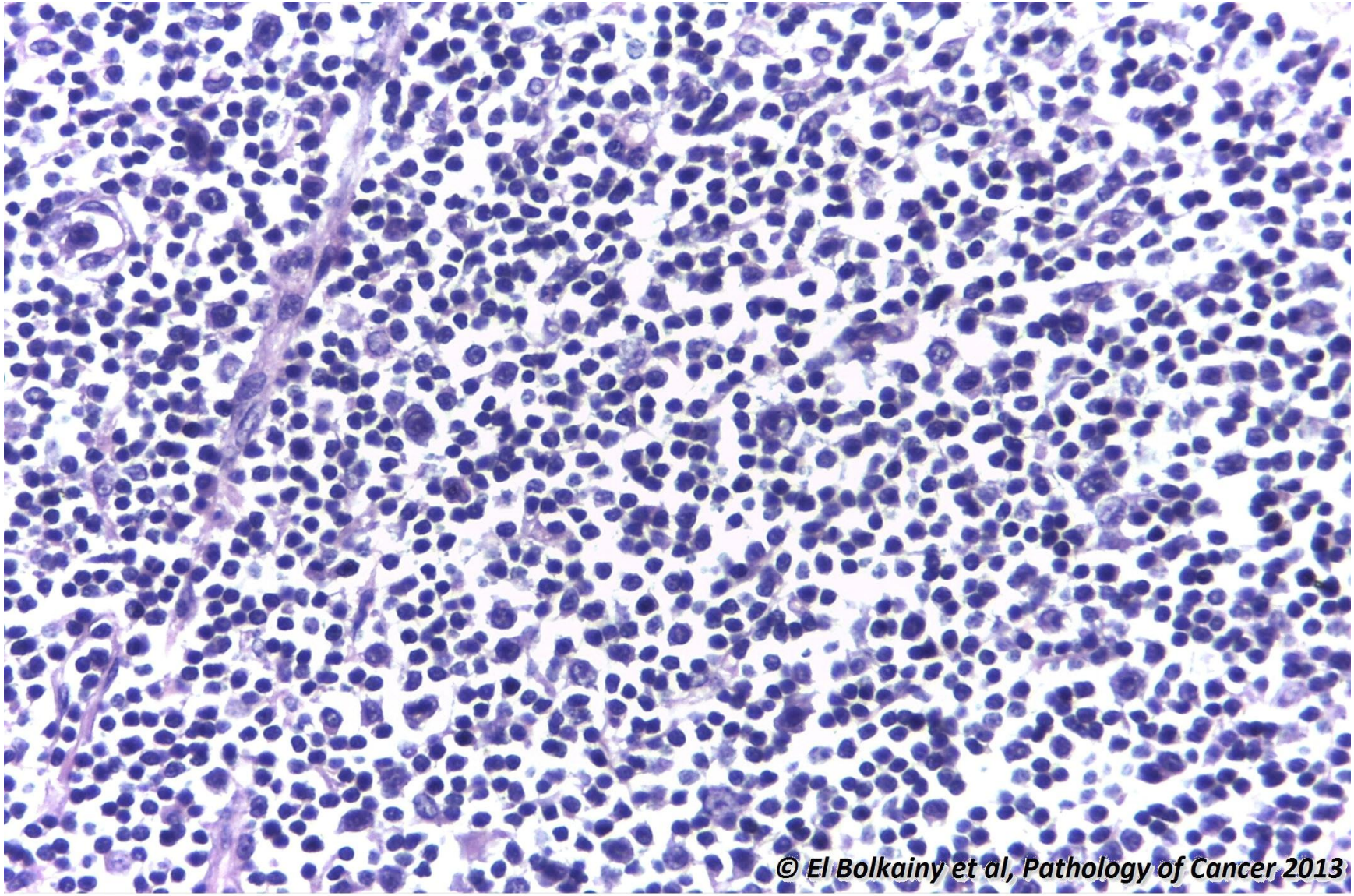
Picture 25-33 **Progressive transformation of germinal center.** A large follicle is present among normal follicles (4 times larger). Lymphocytes of mantle layer extend into the follicle (colonization). This lesion may progress to nodular lymphocyte predominance Hodgkin lymphoma.

25.34 Toxoplasmosis follicular hyperplasia.



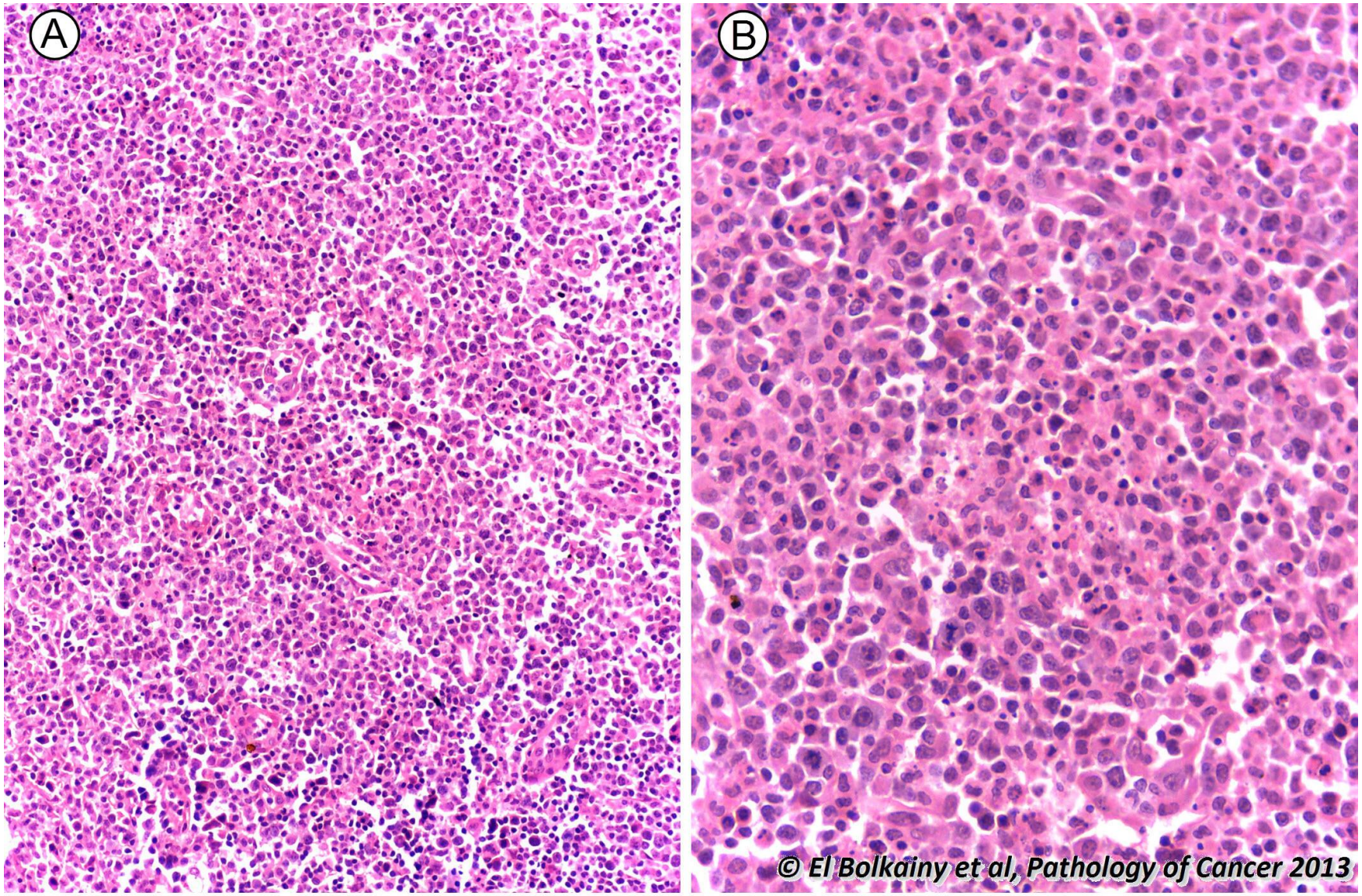
Picture 25-34 **Toxoplasmosis follicular hyperplasia.** It is caused by a protozoa (Toxoplasma Gondii). There are scattered epithelioid histiocytes with eosinophilic cytoplasm located in both interfollicular areas and germinal centers. Serology tests are confirmatory.

25.35 Infectious mononucleosis (EBV infection).



Picture 25-35 **Infectious mononucleosis (EBV infection).** There is marked paracortical expansion, but residual germinal centers are always present, scattered atypical immunoblasts (CD30+ and CD15-), atypical lymphoid cells are polyphenotypic (B and T mixture). Serology tests are positive for EBV.

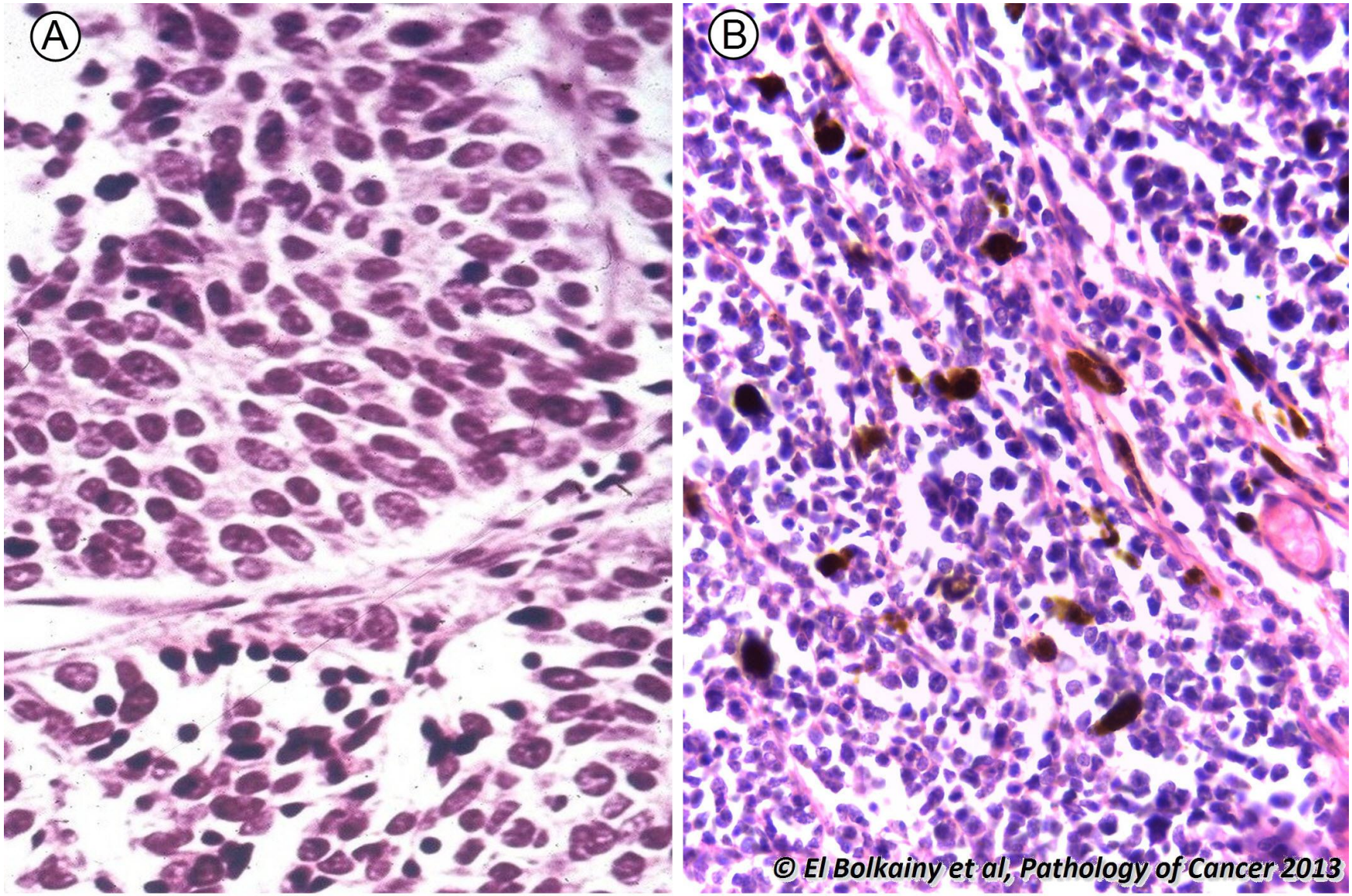
25.36 Kikuchi necrotizing lymphadenitis.



Picture 25-36

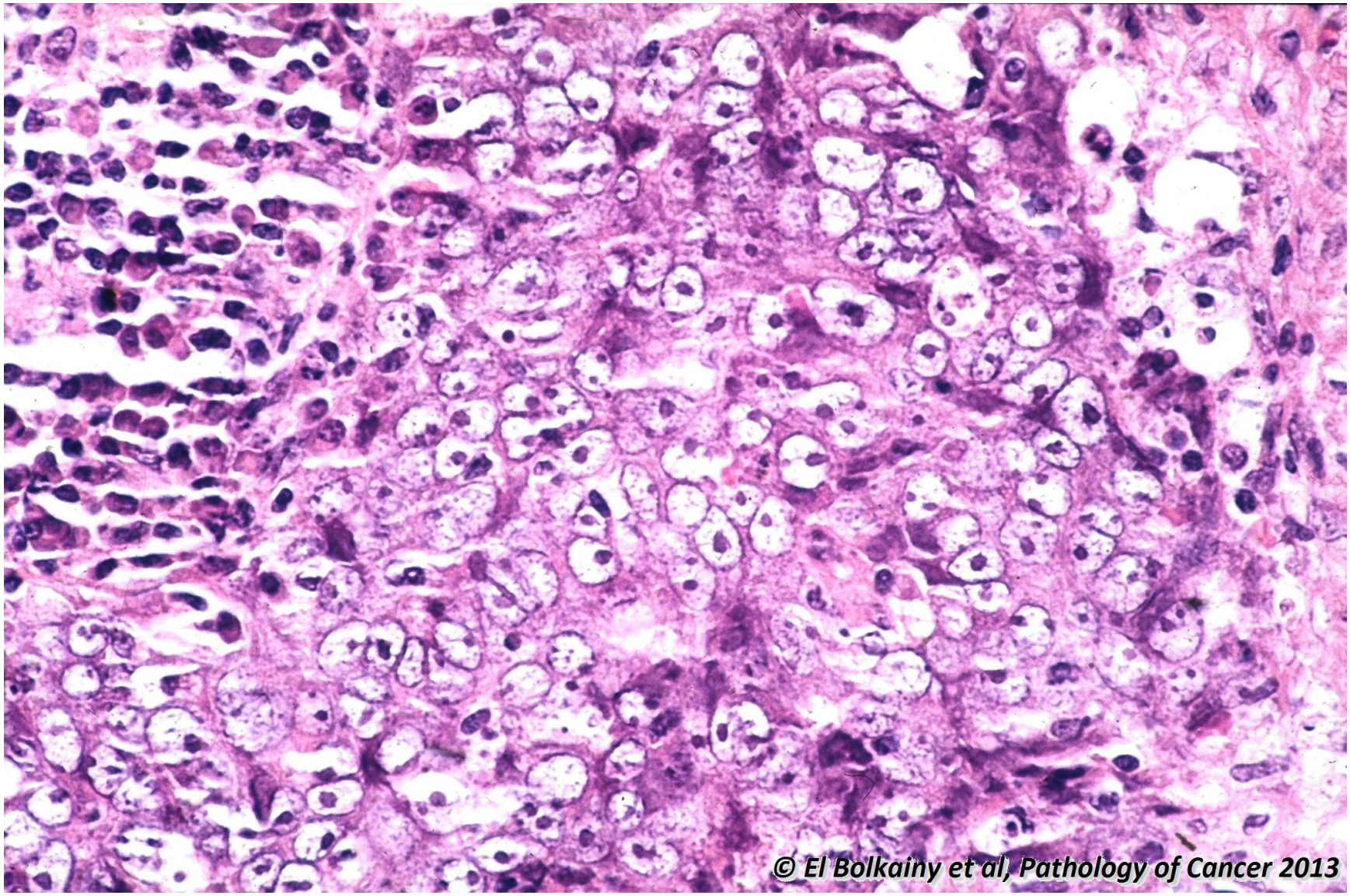
Kikuchi necrotizing lymphadenitis. An idiopathic self limited disease which should resolve in two months. It shows geographic areas of necrosis with nuclear fragmentation but no neutrophils, bordered by zones rich in histiocytes (CD68+) and T rather than B-cells.

25.37 Small round cell neuroectodermal tumors.



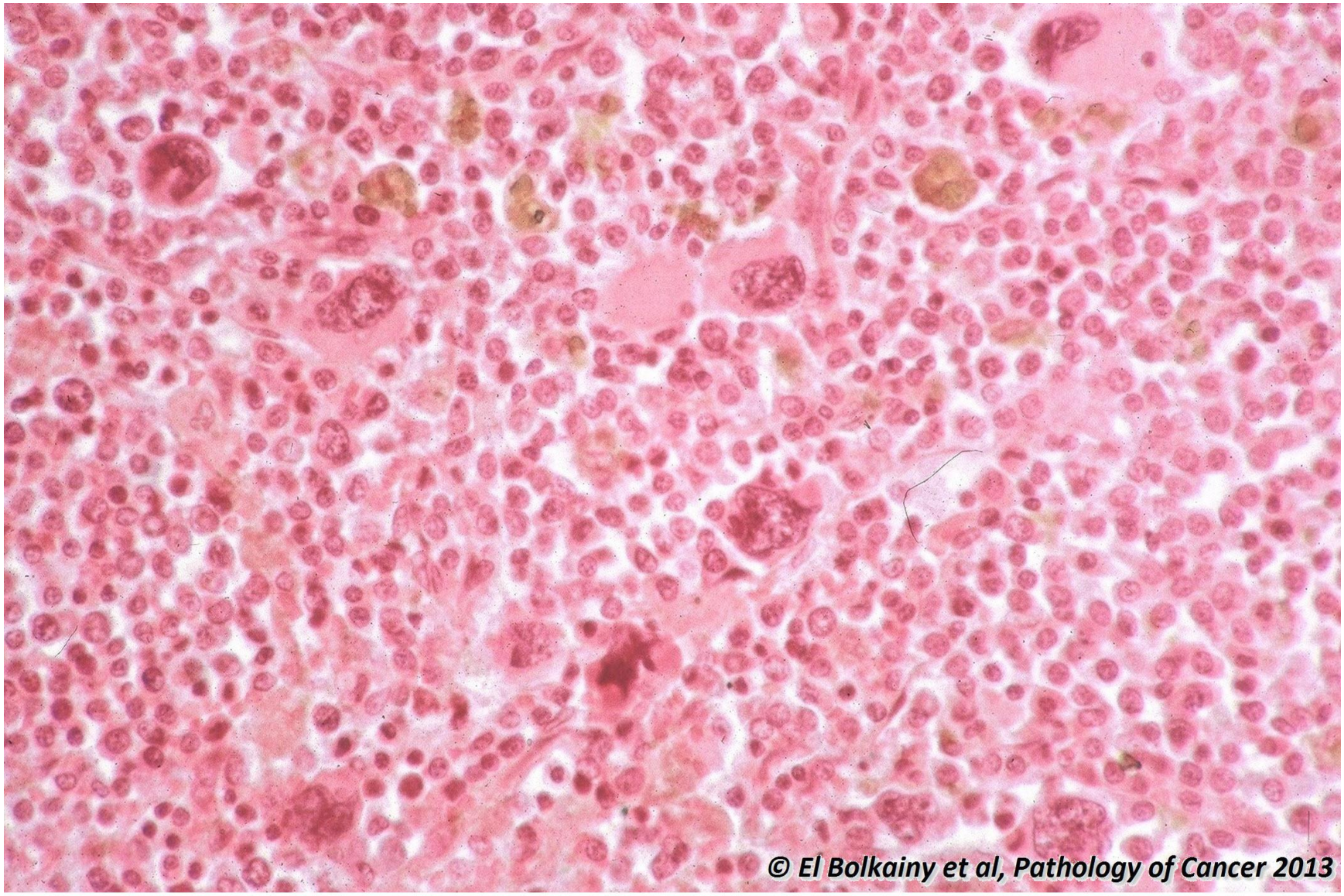
Picture 25-37 **Small round cell neuroectodermal tumors. A** Undifferentiated small cell lung cancer cells are arranged in groups, show nuclear molding and positive to chromogranin. **B** Small cell malignant melanoma is S-100 and Melan-A+.

25.38 Large cell undifferentiated nasopharyngeal carcinoma.

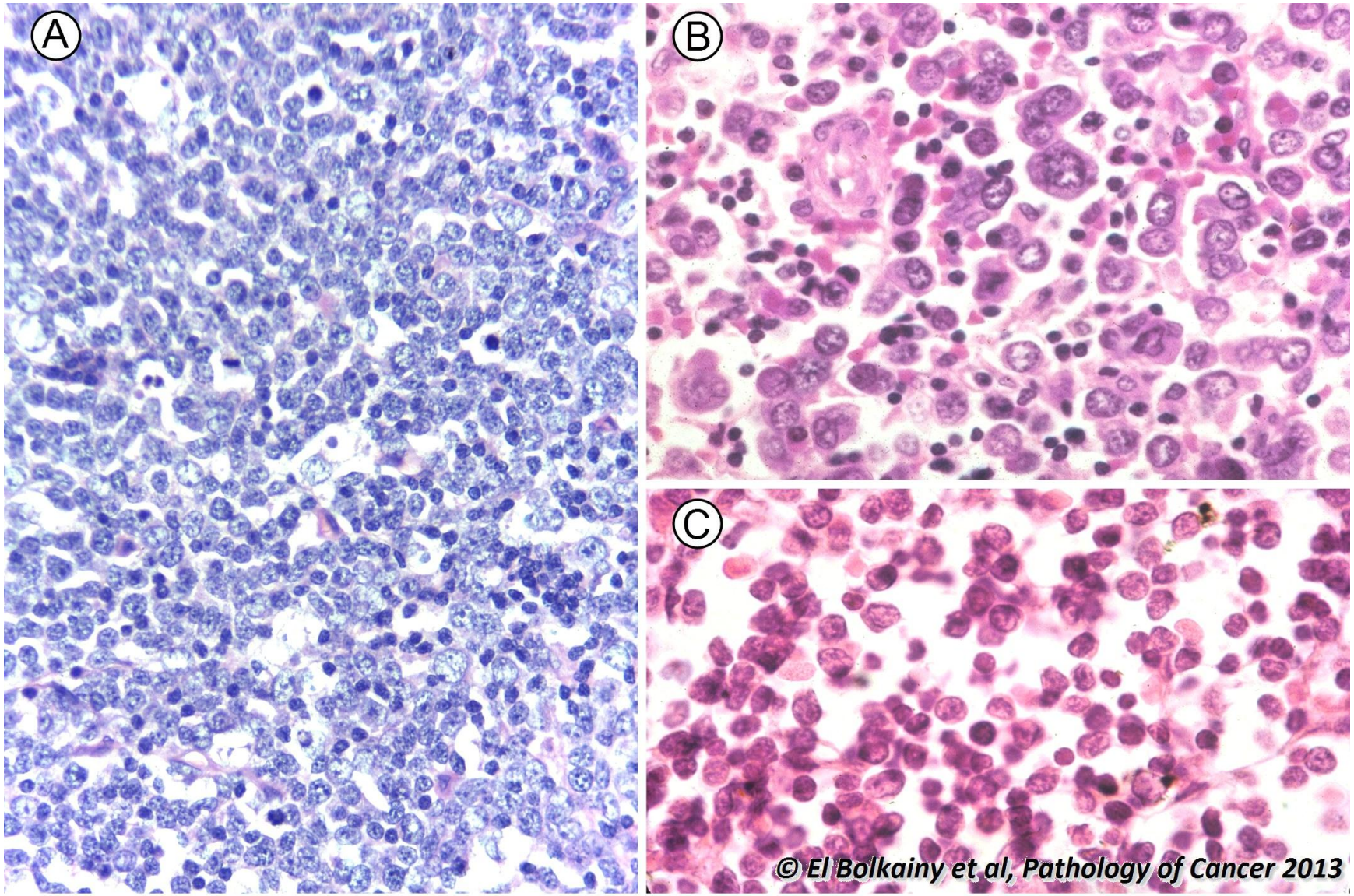


Picture 25-38 **Large cell undifferentiated nasopharyngeal carcinoma.** It is immunoreactive to pancytokeratin and negative for LCA.

25.39 Extramedullary hematopoiesis, histology.



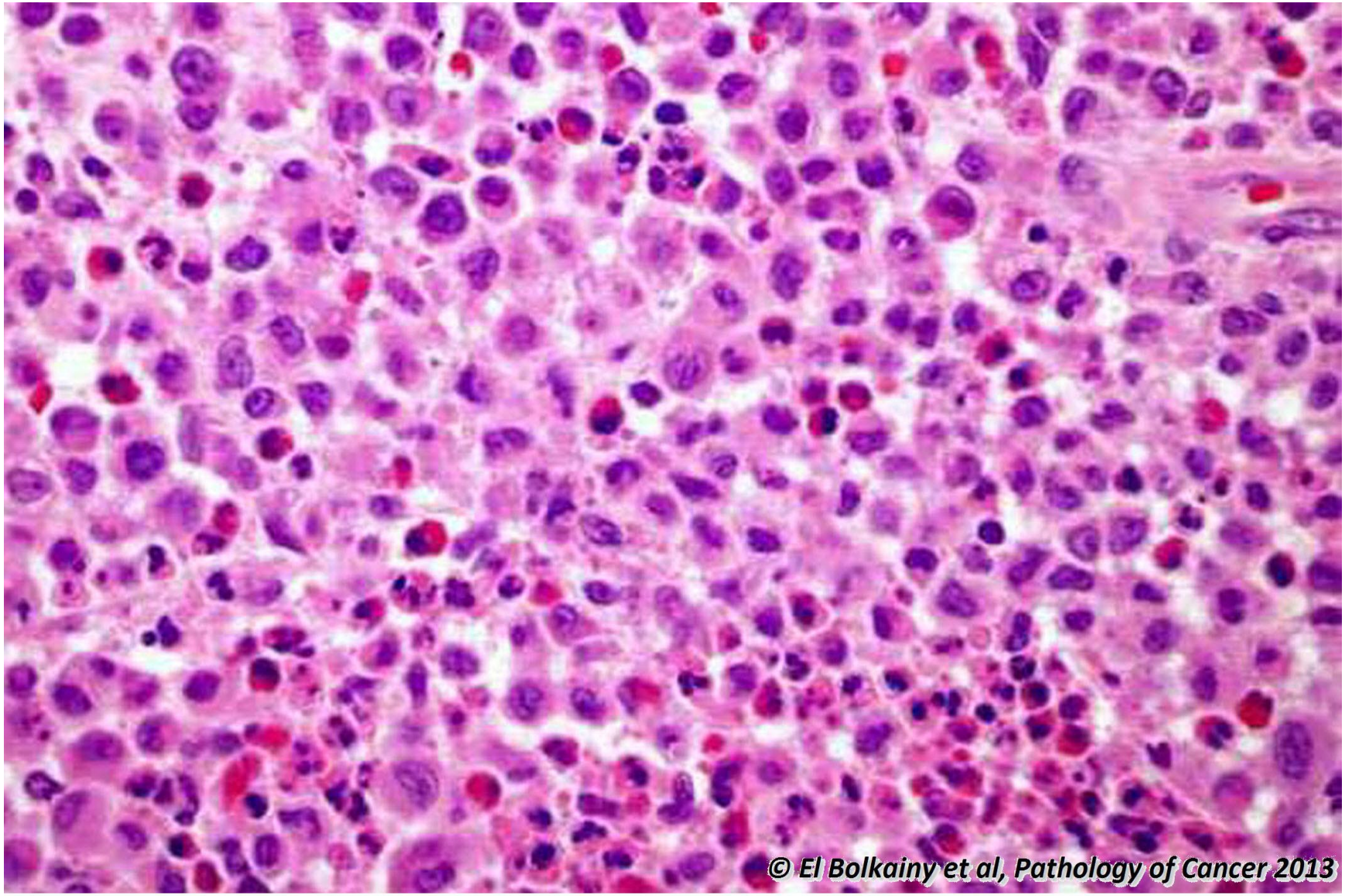
Picture 25-39 **Extramedullary hematopoiesis, histology.** This is a compensatory physiologic response to bone marrow failure. All cell lineages (erythroid, megakaryocytic and myeloid) show all stages of normal differentiation. Blast cells are rare (<5%). Myeloid cells are immunreactive to CD117 and lymphoid cells to LCA.



Picture 25-40

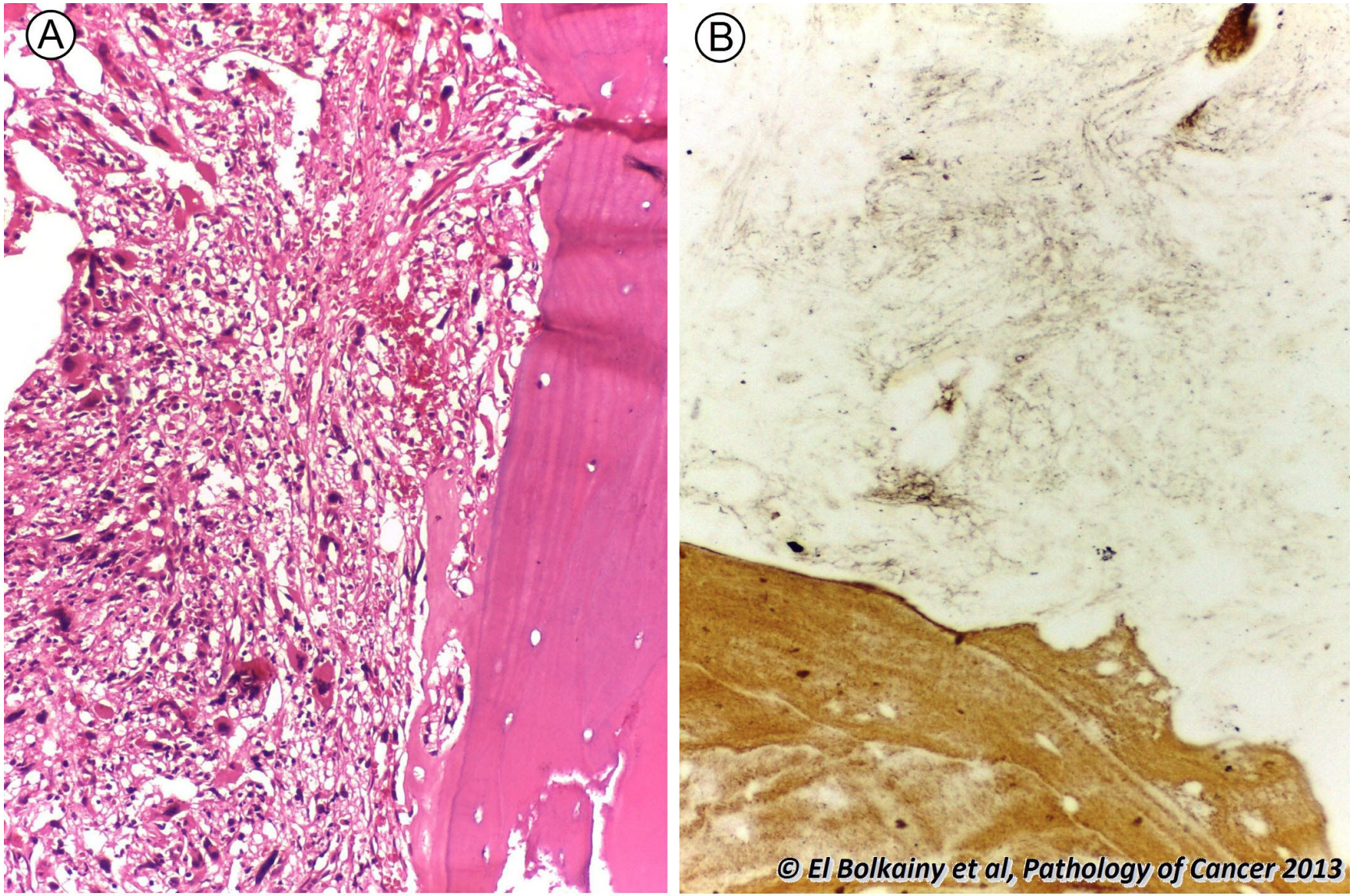
Myeloid neoplasms and leukemias. A Myeloid sarcoma showing immature cells, high blast count (CD34+, >20%). Cytoplasmic granules are more evident in Giemsa-stained touch cytology preparations. **B** Erythroid leukemia. **C** Acute monocytic leukemia, tissue infiltrate. Immunostains: Myeloperoxidase+, CD34 and CD117+. (CD13+ and CD33+ by flow cytometry.

25.41 Langerhans cell histiocytosis (eosinophilic granuloma), histology.



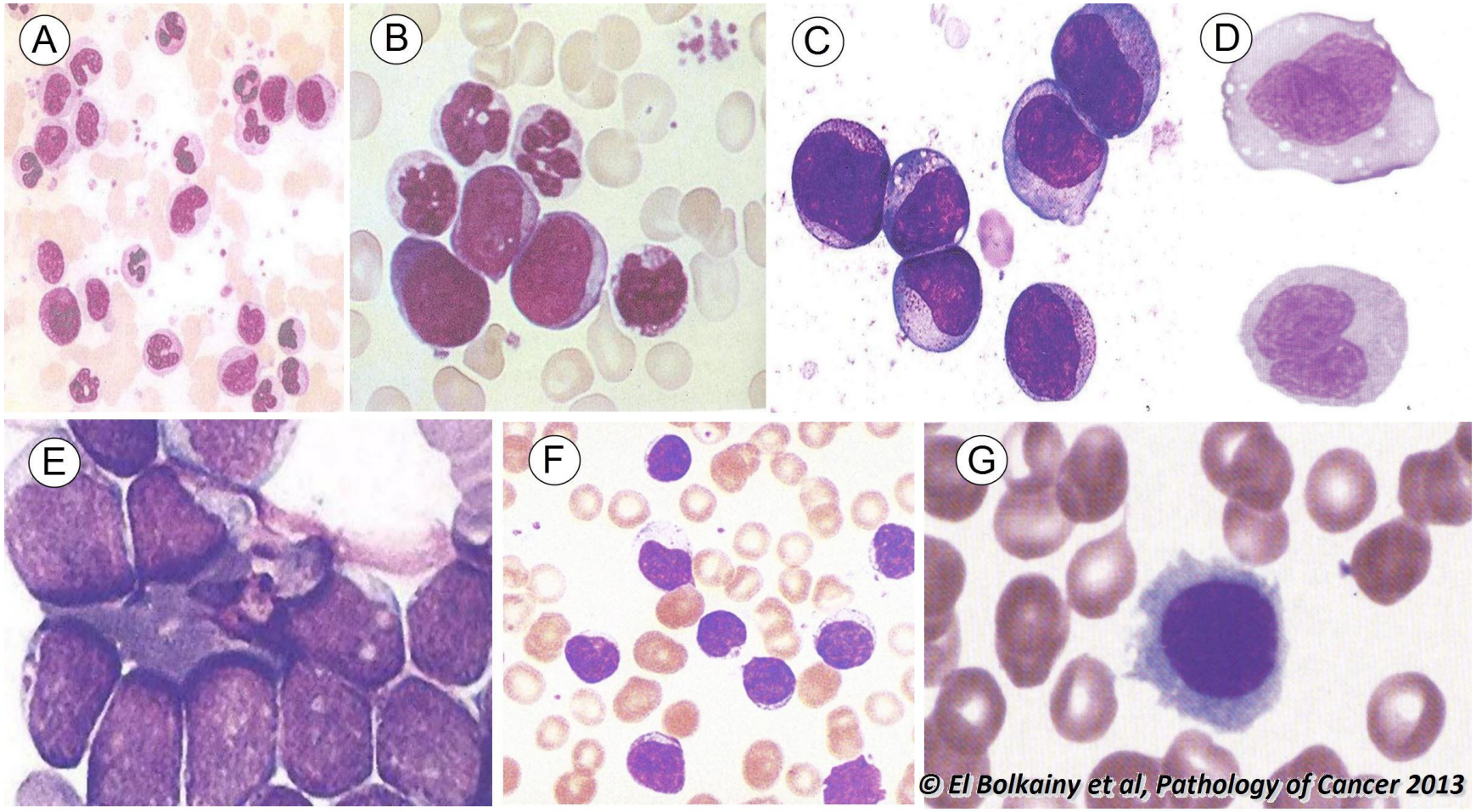
Picture 25-41 **Langerhans cell histiocytosis (eosinophilic granuloma), histology.** A mixed population of histiocytes, lymphocytes and eosinophils. Confirmatory immunostains: CD207 (Langerin)+, S-100+ and CD1a+.

25.42 Chronic idiopathic myelofibrosis, late phase.



Picture 25-42 **Chronic idiopathic myelofibrosis, late phase. A** Hypocellular marrow with fibrosis and osteosclerosis. Atypical small megakaryocytes occur in clusters. **B** Special stains show increased reticulin fibers in the marrow.

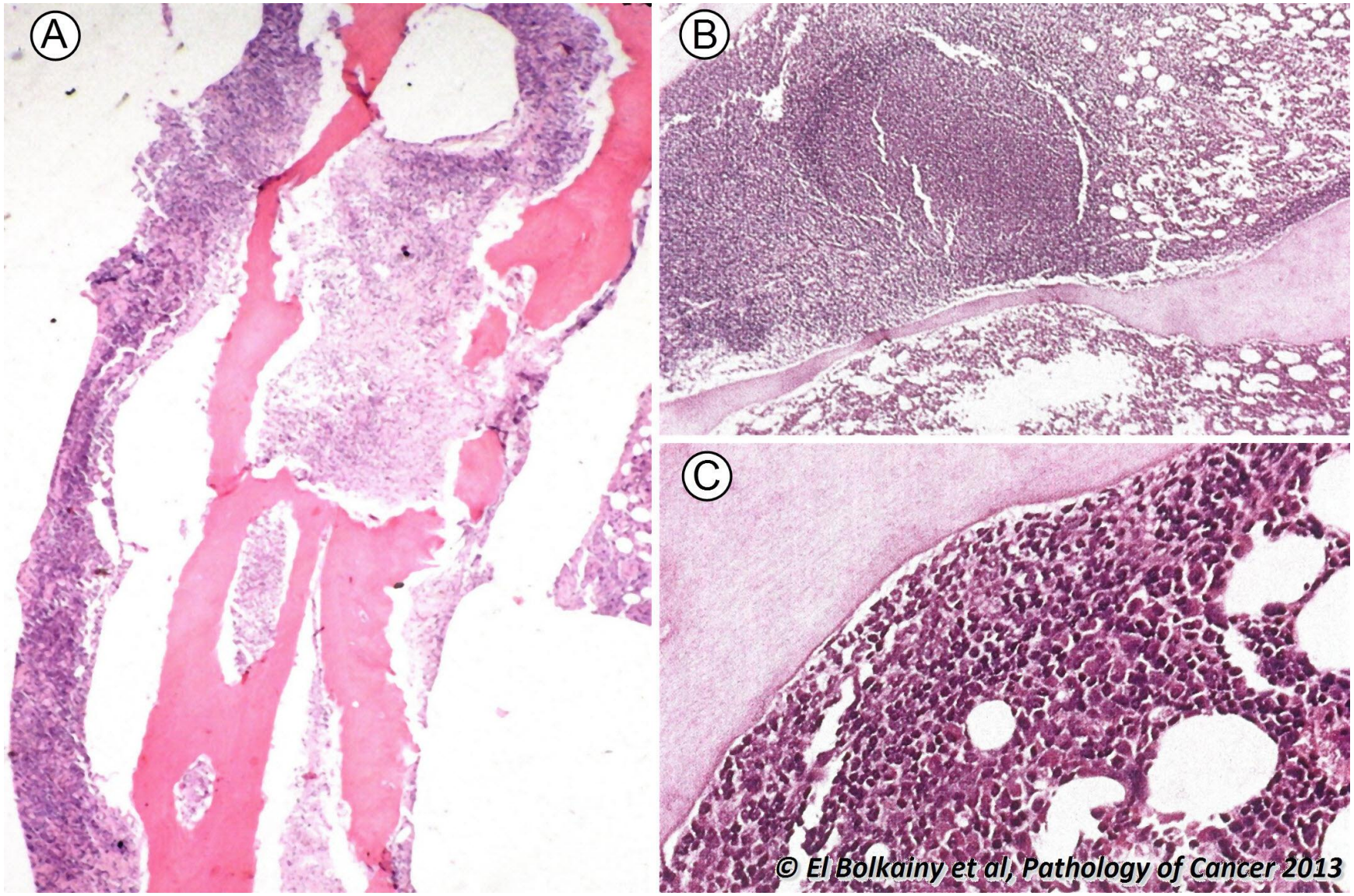
25.43 Cytomorphology of leukemias, Giemsa stained smears.



Picture 25-43

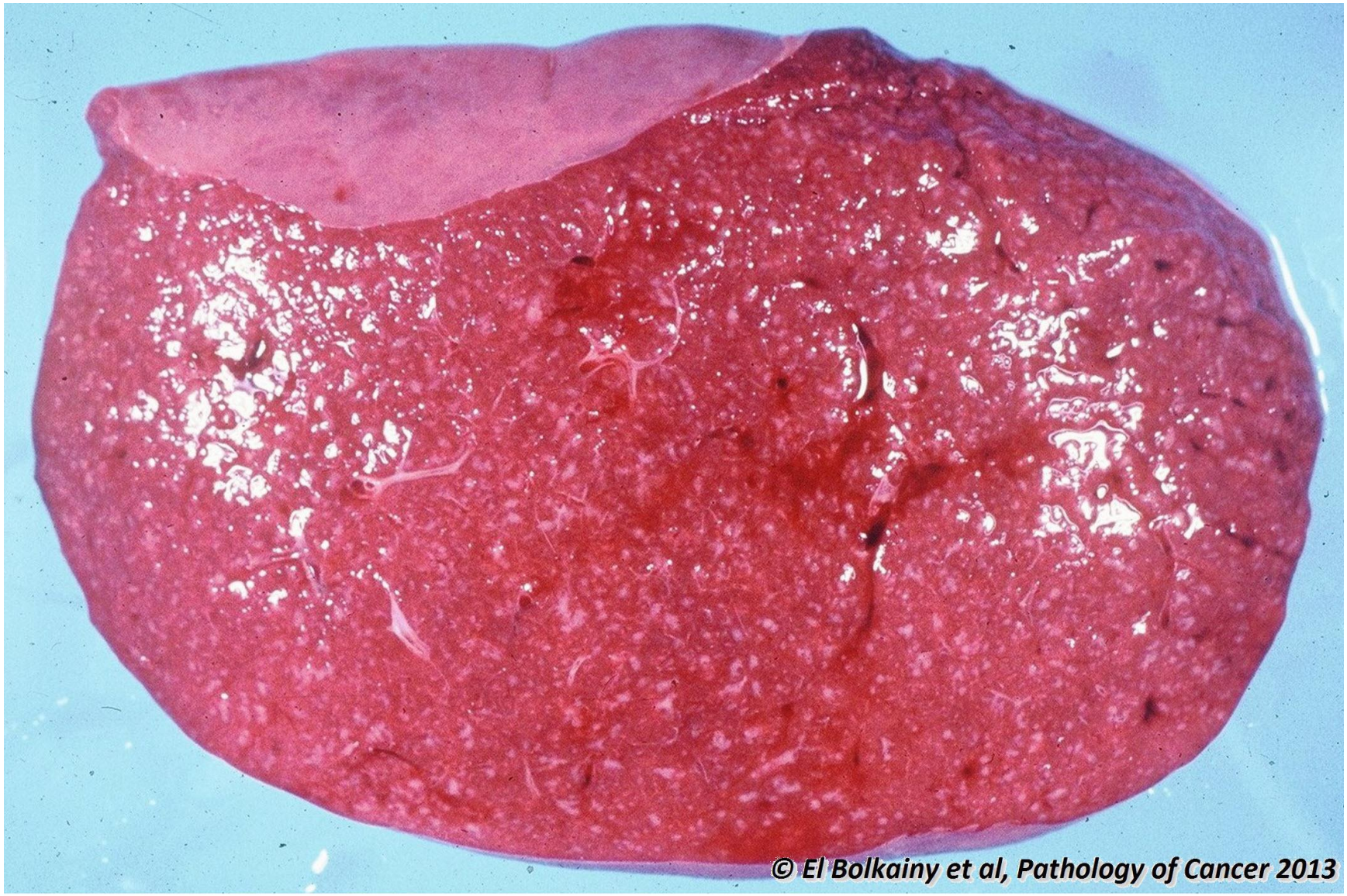
Cytomorphology of leukemias, Giemsa stained smears. A Chronic myeloid leukemia (CML),with numerous immature leukocytes. **B** CML, accelerated phase; 10-19% are myeloblasts. **C** Acute myeloid leukemia, numerous blasts more than 20 %. **D** Monocytic leukemia cells, shows indented nucleus, abundant non-granular cytoplasm with microvacuoles. **E** Acute lymphoblastic leukemia, large nuclear size and very scanty non-granular cytoplasm. **F** Chronic lymphocytic leukemia, small cells with condensed chromatin and scanty cytoplasm. **G** Hairy cell leukemia, small cells with dense chromatin, irregular cytoplasm with hairy appearance.

25.44 Patterns of bone marrow involvement by non-Hodgkin lymphoma.



Picture 25-44 **Patterns of bone marrow involvement by non-Hodgkin lymphoma. A** Paratrabecular pattern. **B** Nodular pattern. **C** Interstitial pattern. Immunostains (CD20 and CD3) will reveal the phenotype of the infiltrate.

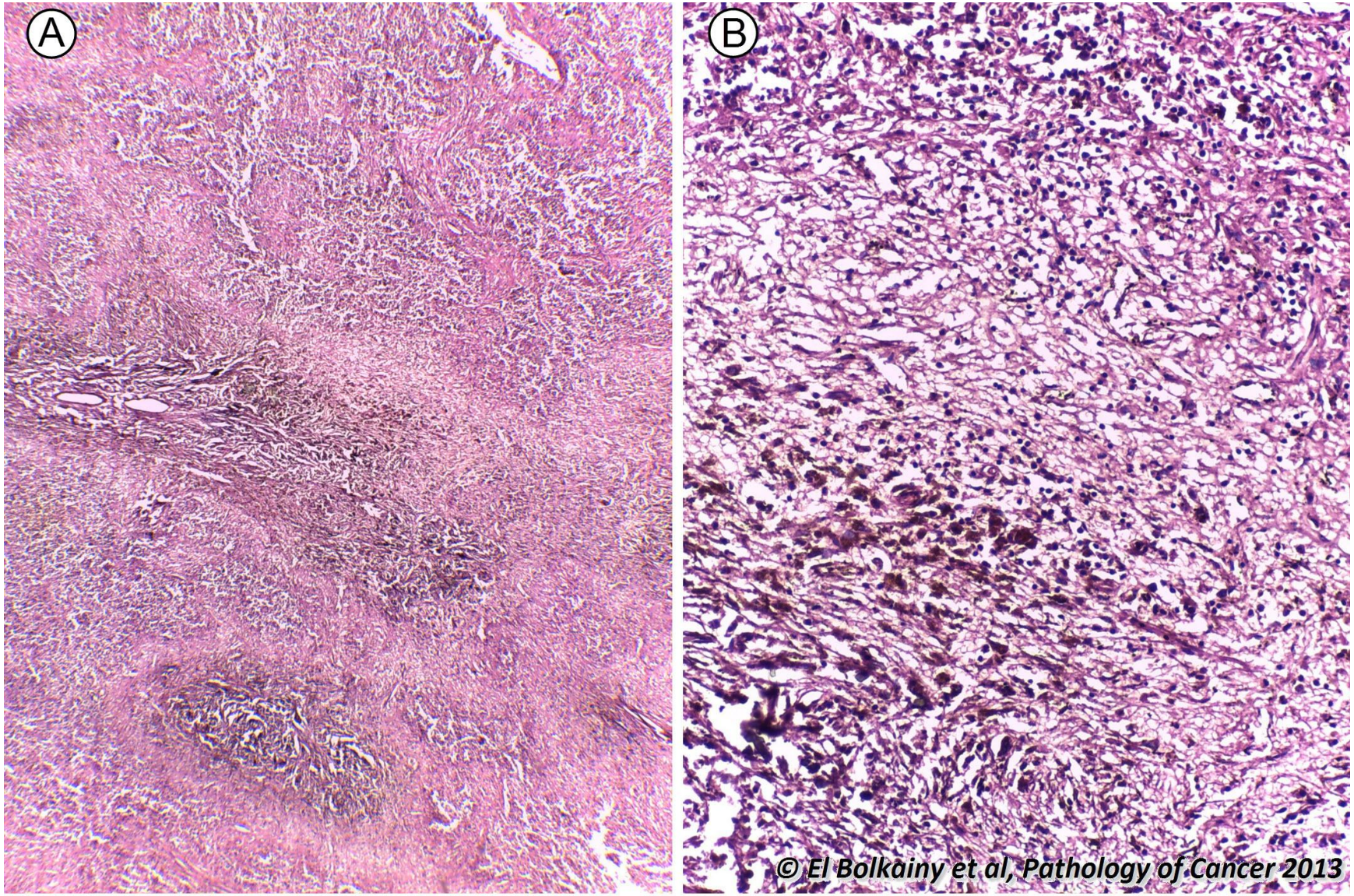
25.45 Chronic venous congestion of spleen complicating liver cirrhosis.



Picture 25-45

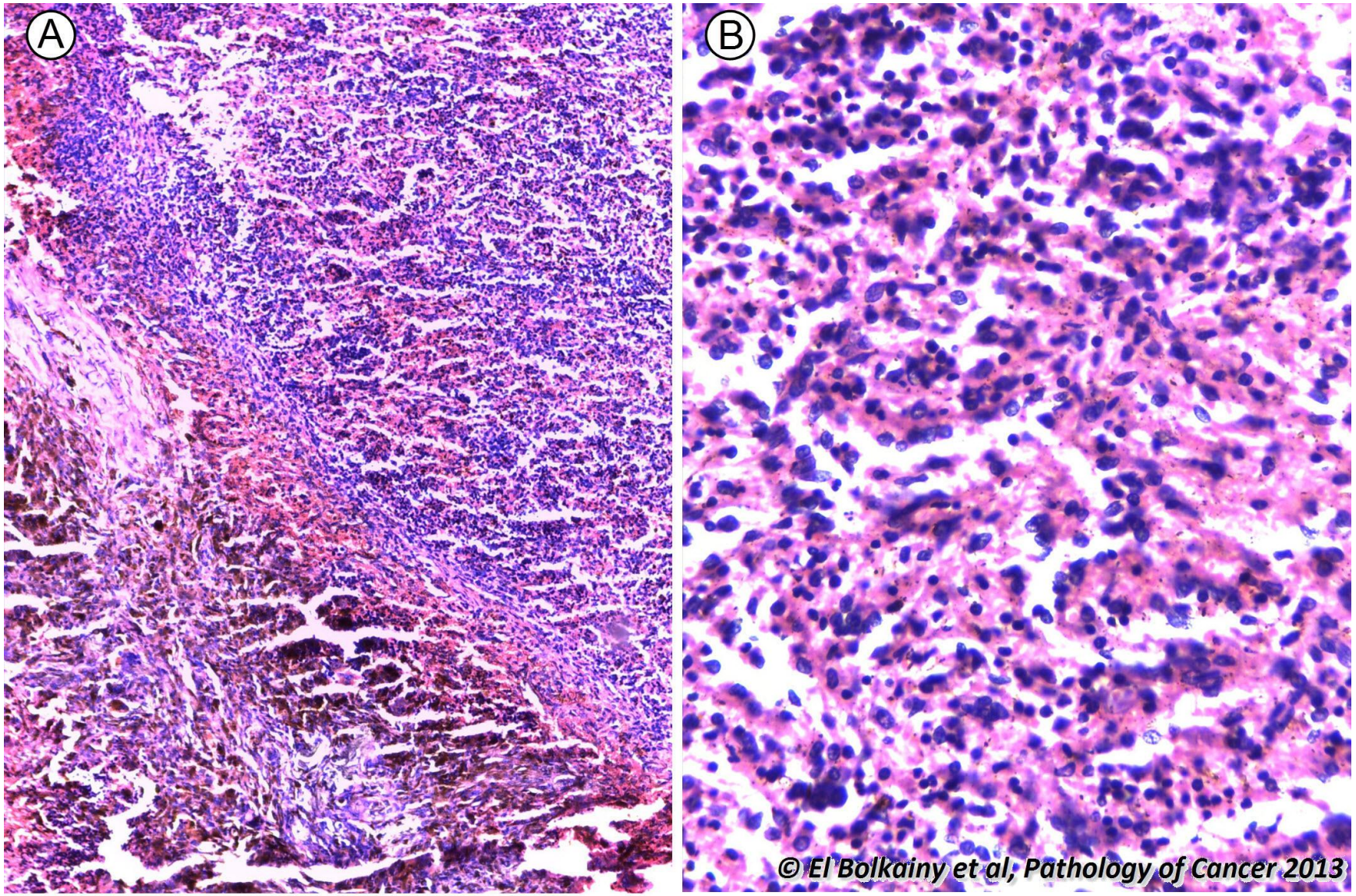
Chronic venous congestion of spleen complicating liver cirrhosis. Grossly: diffuse red pulp congestion, prominent fibrous trabecula and atrophic lymphoid follicles. Histology is characterized by sinuses congested by red blood cells associated with increase of stroma of cords, as well as, expression of actin due to hyperplasia of myoid cells.

25.46 Hemolytic anemia (hereditary spherocytosis and sickle cell anemia), histology.



Picture 25-46 **Hemolytic anemia (hereditary spherocytosis and sickle cell anemia), histology.** Diffuse red pulp affection, splenic cords are distended with red blood cells, but sinuses are empty. Fibrosiderotic nodules represent a fibrotic reaction to hemosiderin deposits.

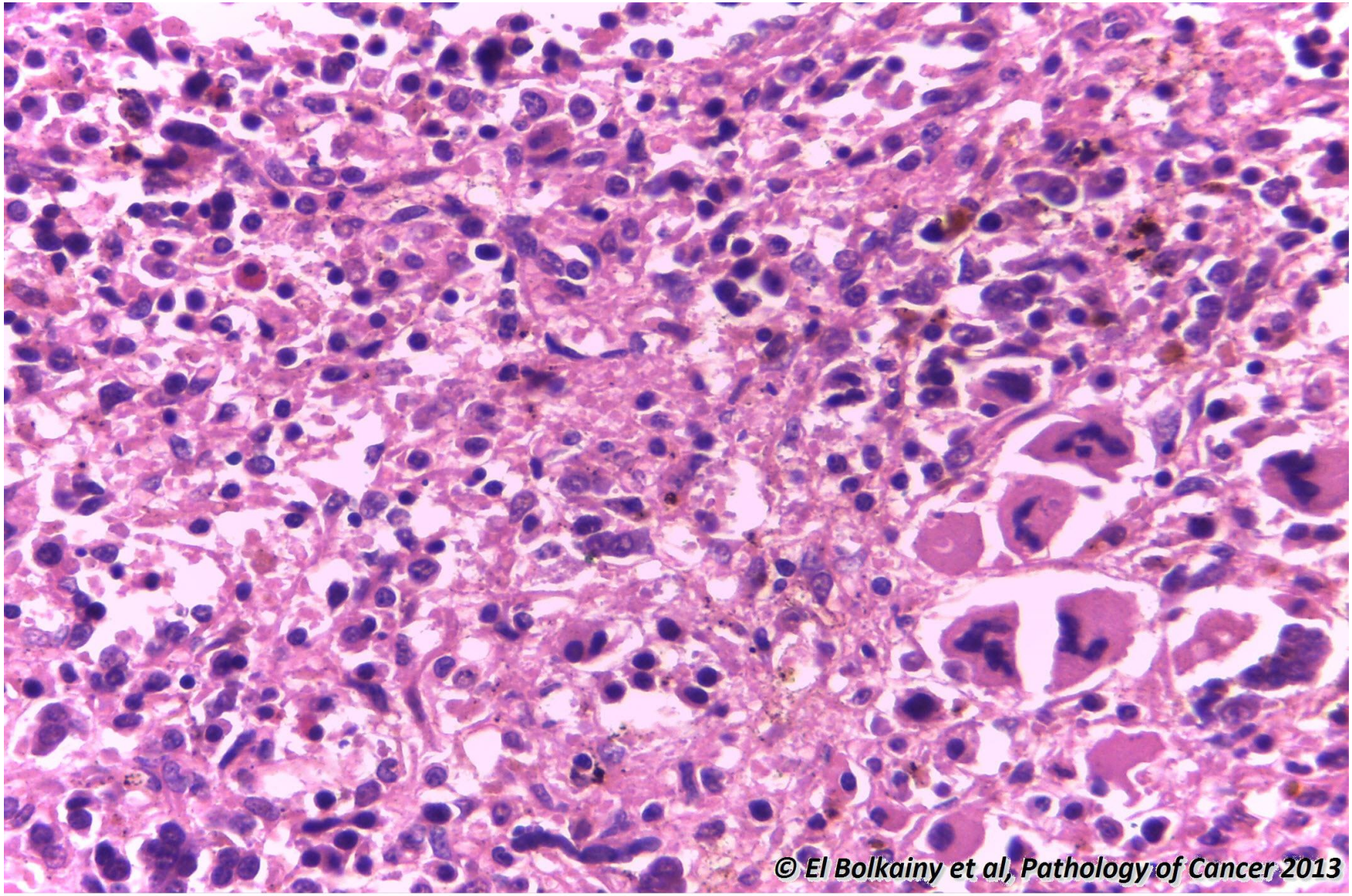
25.47 Thalassemia, histologic features in spleen.



Picture 25-47

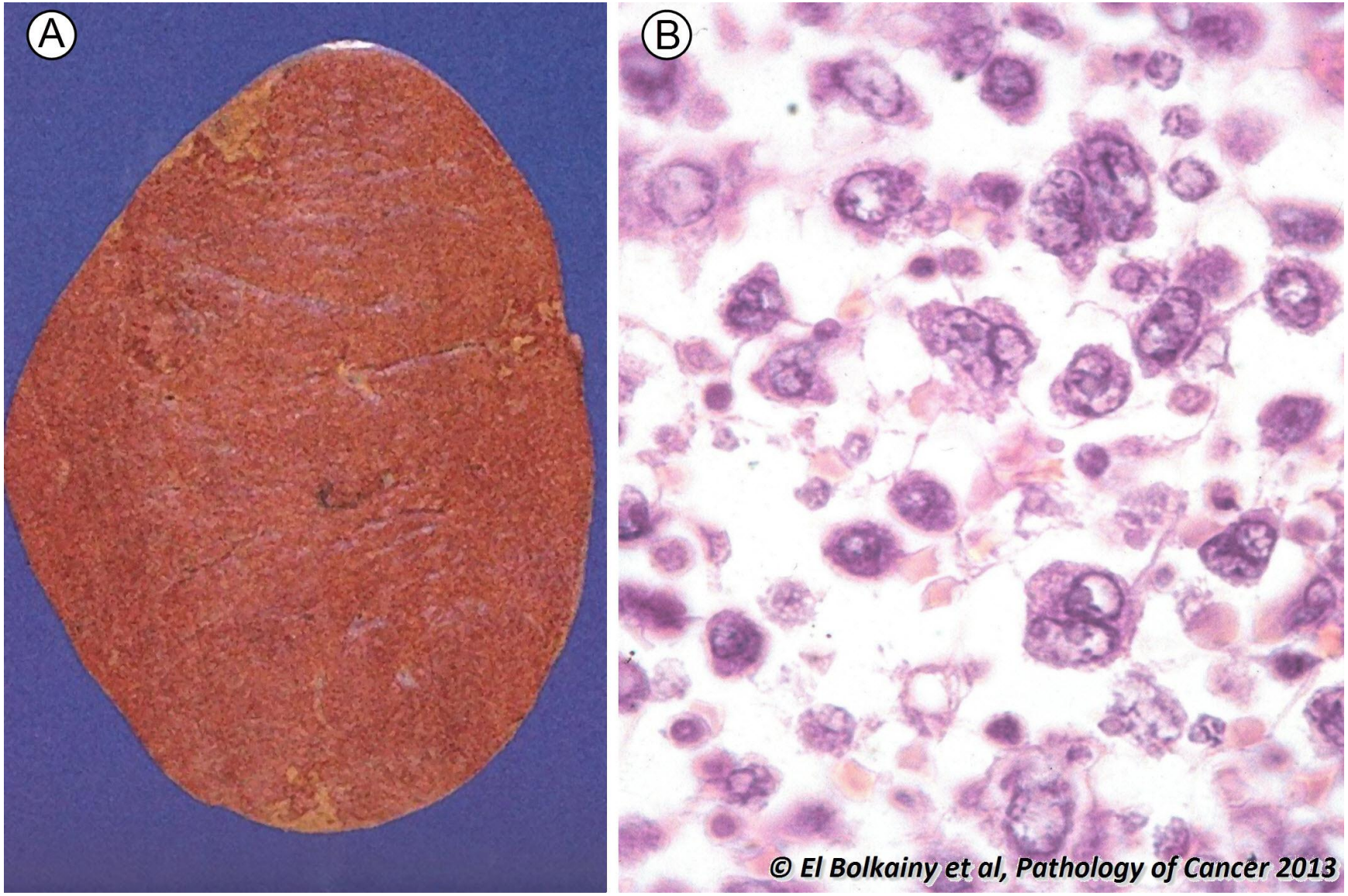
Thalassemia, histologic features in spleen. Thalassemia is a hemoglobin disorder of genetic origin. In hemoglobin H disease, RBCs are more liable to sequestration and phagocytosis in spleen. **A** A fibrosiderotic lesion in red pulp. **B** Degenerated red blood cells phagocytosed in splenic cords.

25.48 Myeloid dysplasia in myelodysplastic syndrome (polycythemia vera).



Picture 25-48 **Myeloid dysplasia in myelodysplastic syndrome (polycythemia vera).** Dysplasia involves erythroid and megakaryocytic lineages (bilinear). Grouping of megakaryocytes in clusters which normally does not occur is characteristic of myeloid dysplasia. Blast count (5-20%). Blood picture shows cytopenia.

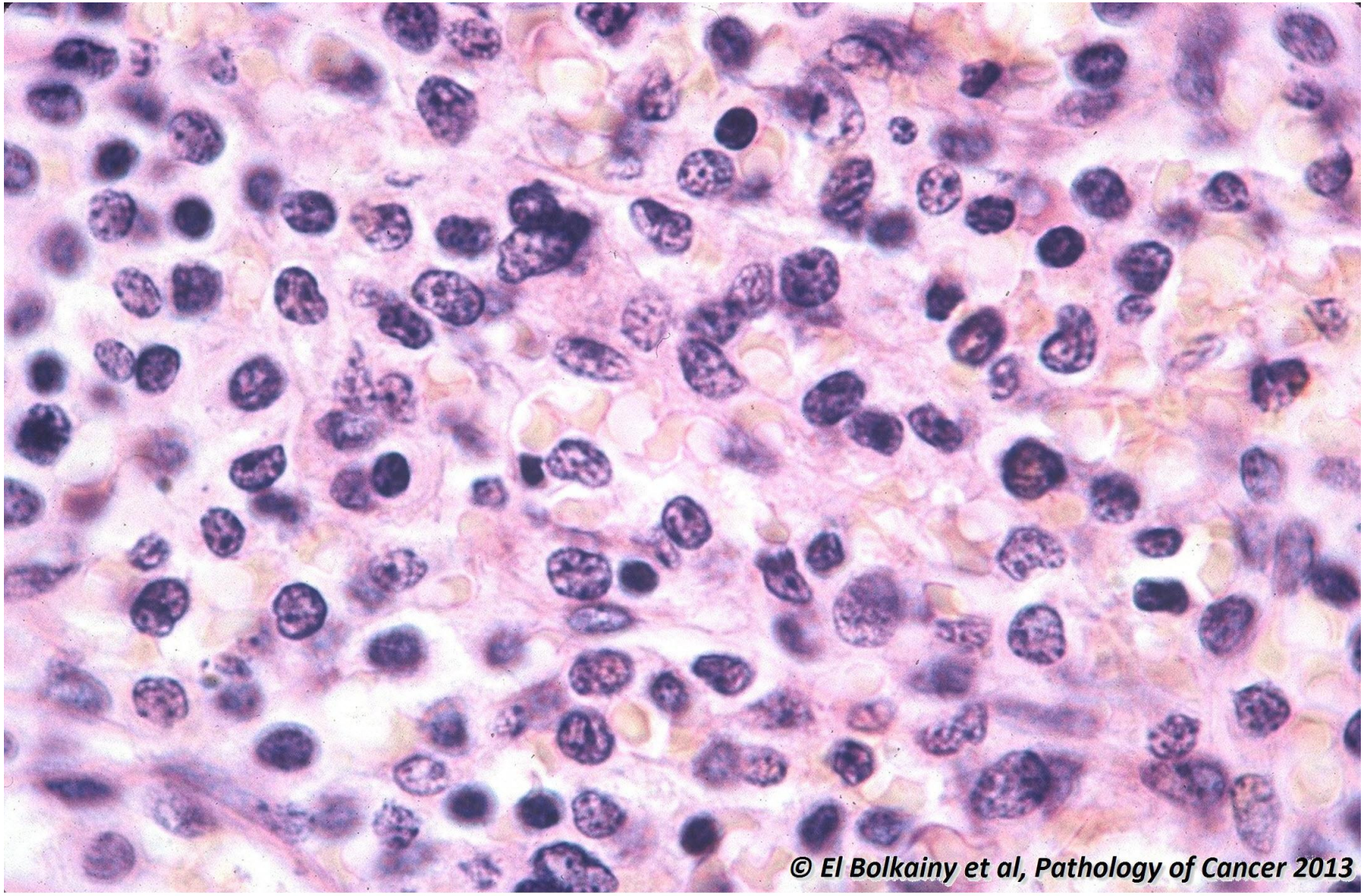
25.49 Chronic myeloid leukemia (CML).



Picture 25-49

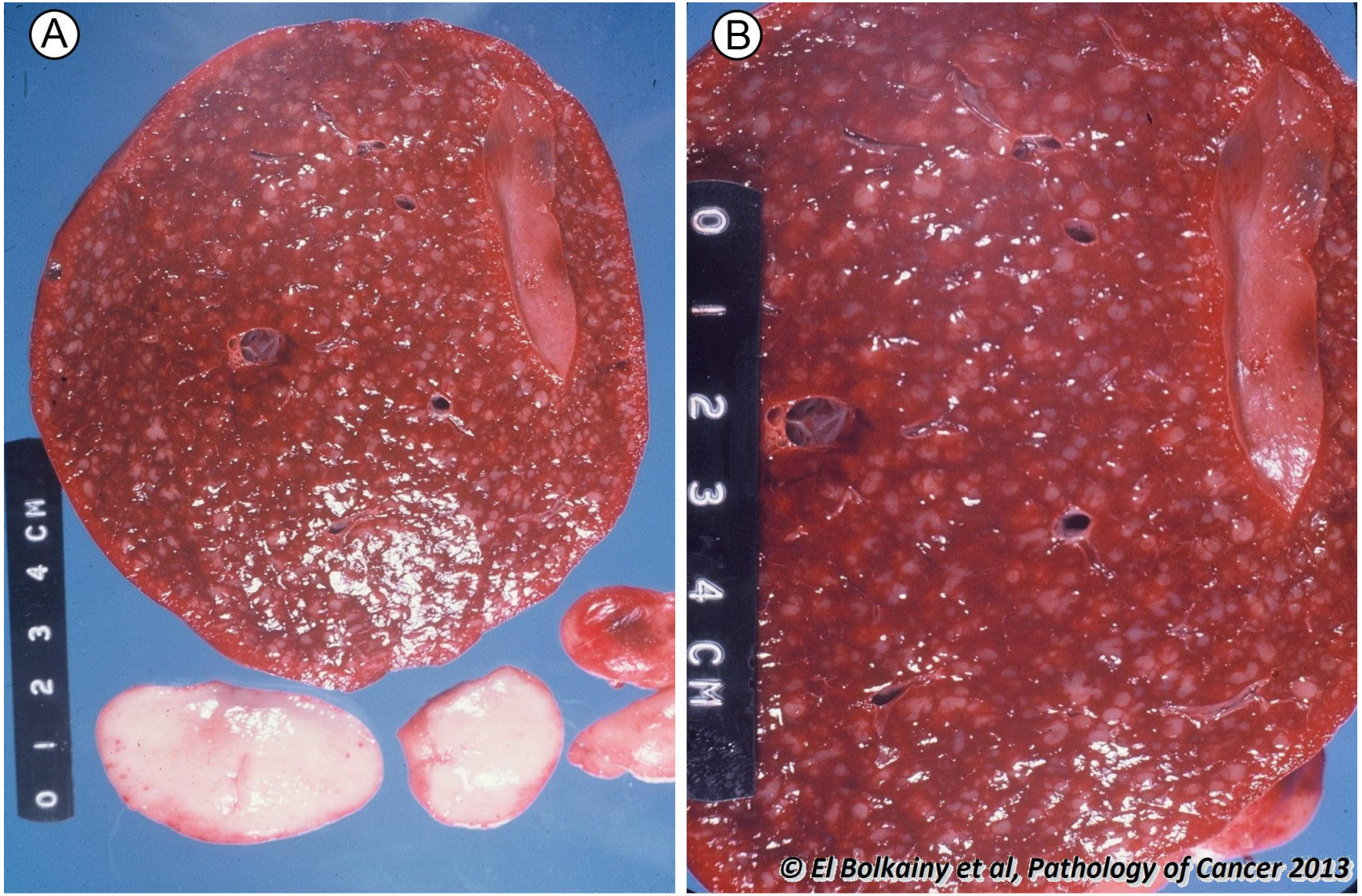
Chronic myeloid leukemia (CML). A Huge splenomegaly with diffuse red pulp affection and dark red color. **B** All three hematopoietic cell lines are increased at different stages of maturation (mature cells predominate), but blast count <20%. Immunostains: myeloperoxidase+, CD117+. Cytogenetics, Philadelphia chromosome positive and blood picture shows increased myeloid cell count.

25.50 Hairy cell leukemia (characterized by splenomegaly with diffuse red color), histology.



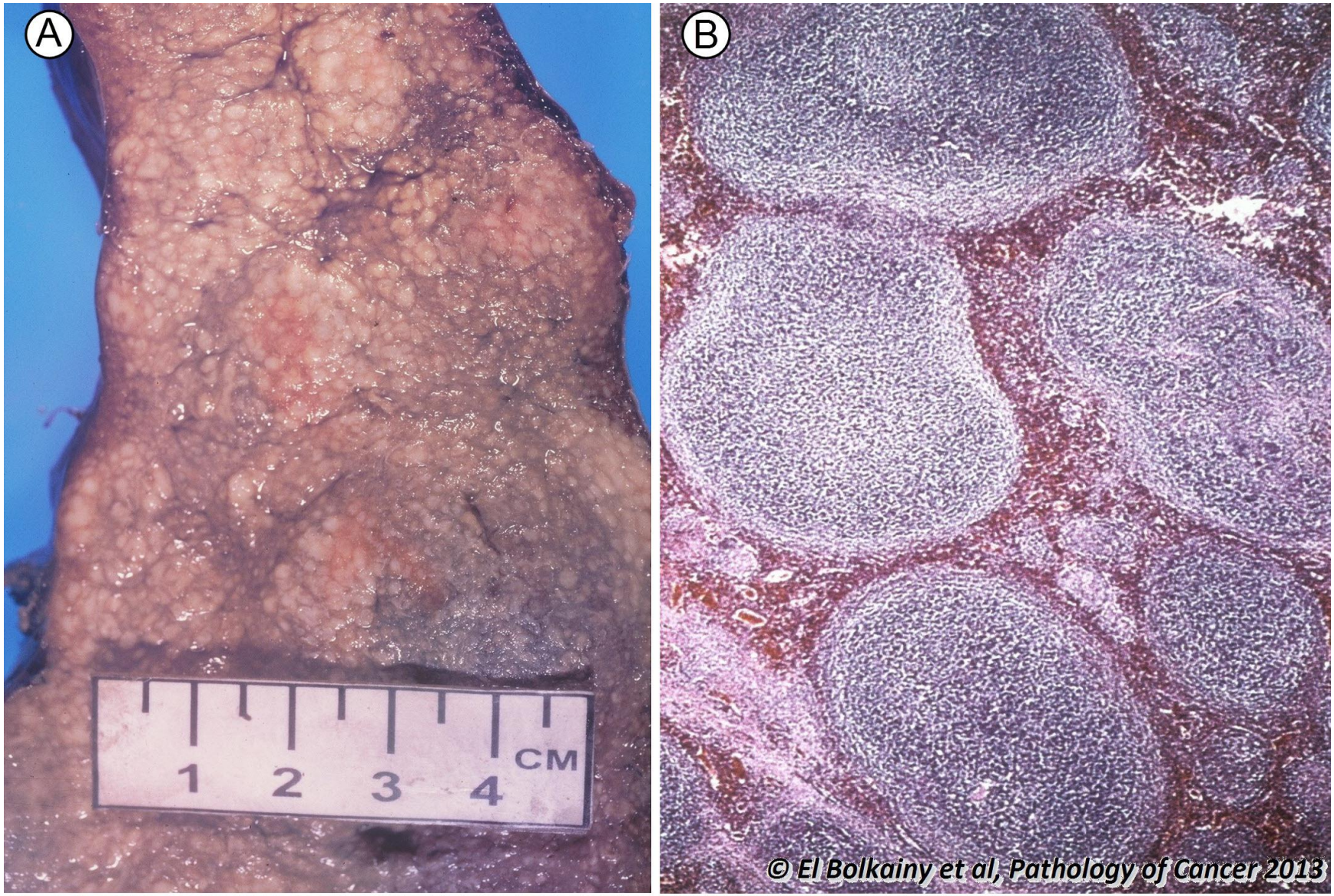
Picture 25-50 **Hairy cell leukemia (characterized by splenomegaly with diffuse red color), histology.** Red pulp infiltrate of small lymphocytes (CD20+ and TRAP+) with extravastion of red blood cells. Associated paradox of hypercellular marrow and pancytopenia. BM smears show hairy cytoplasm.

25.51 Chronic lymphocytic leukemia/small lymphocytic lymphoma, gross features.



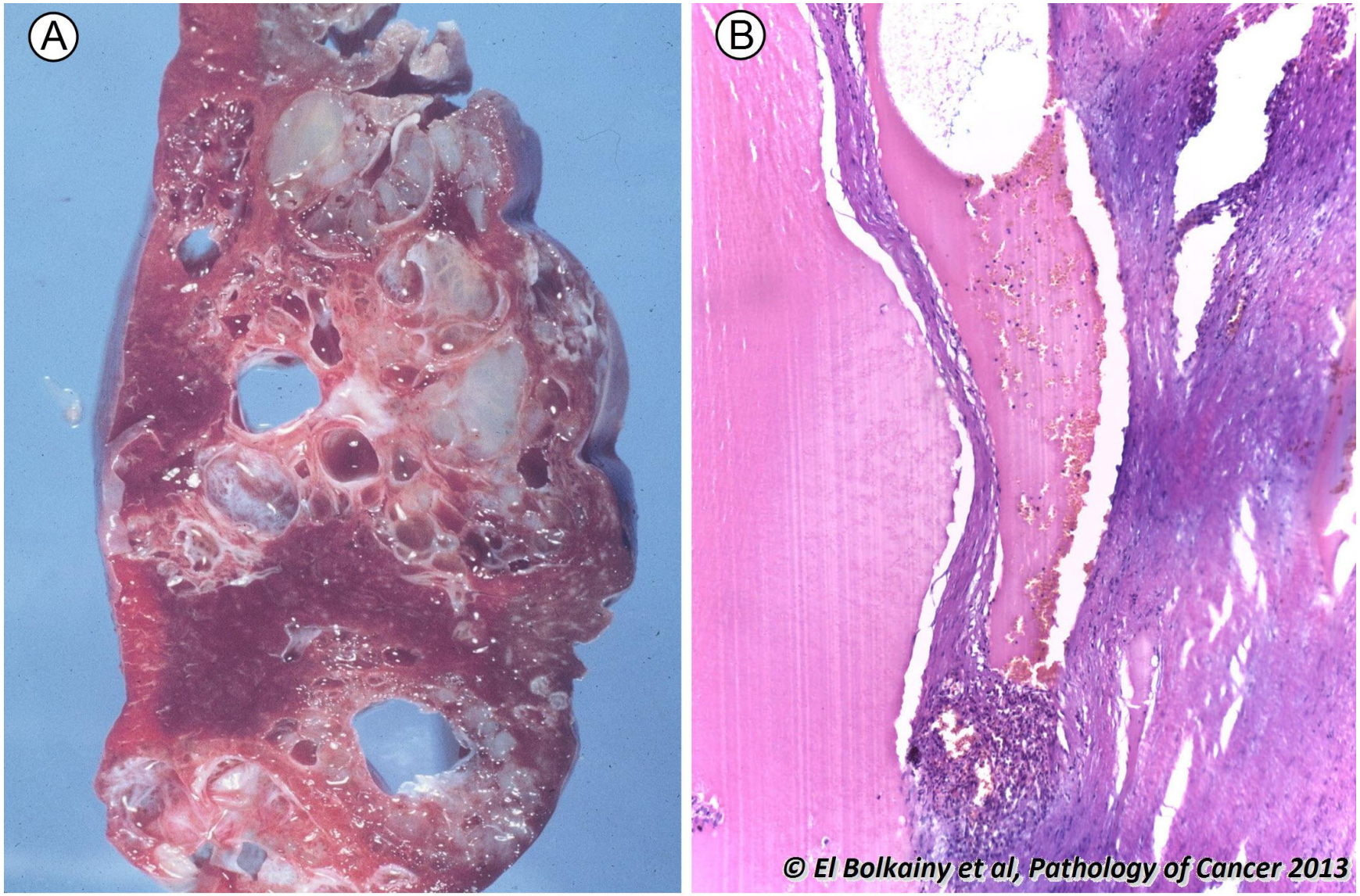
Picture 25-51 **Chronic lymphocytic leukemia/small lymphocytic lymphoma, gross features.** Prominent white pulp with miliary pattern (3-4 mm). Rarely, a diffuse infiltrate in late stages. Hilar nodes of spleen are also involved by lymphoma.

25.52 Marginal zone lymphoma of spleen.



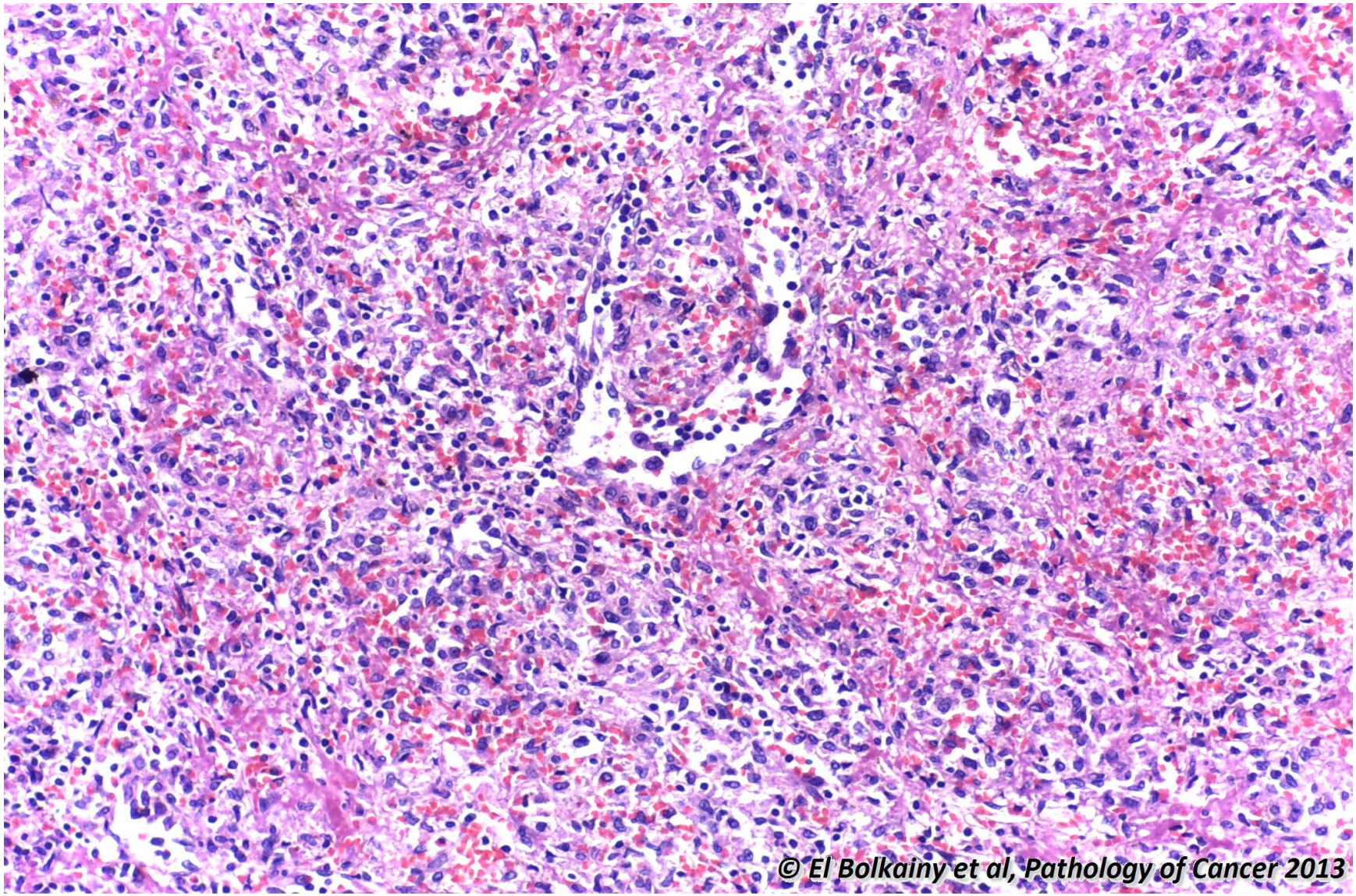
Picture 25-52 **Marginal zone lymphoma of spleen. A** Gross features, white pulp miliary pattern (2-4 mm). **B** Histology, small lymphocytes. Immunostain: CD20+, but CD5- and CD23-.

25.53 Lymphangioma of spleen.



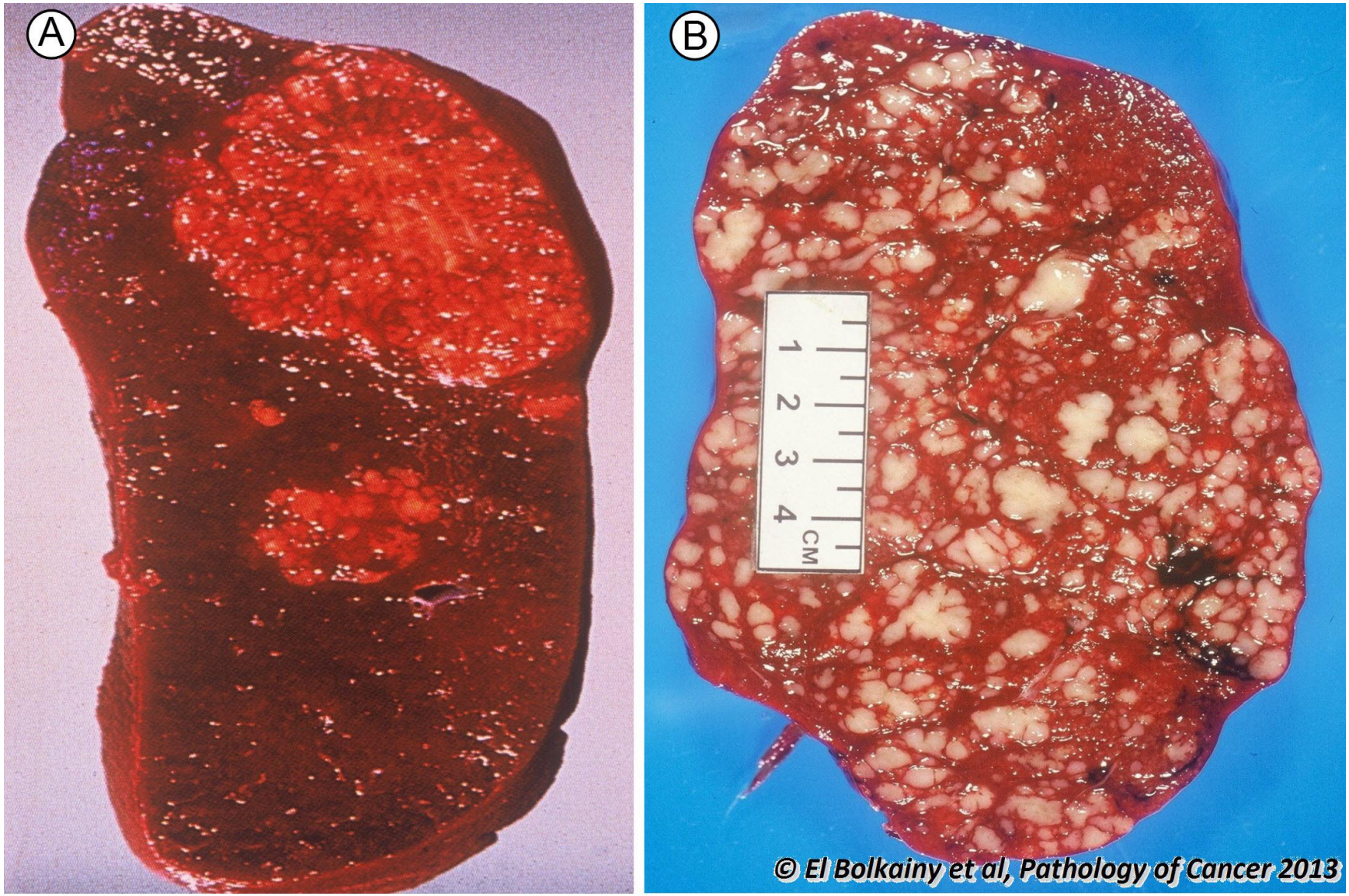
Picture 25-53 **Lymphangioma of spleen. A** Gross features, multiple cystic spaces of variable size. **B** Histology, vascular spaces lined by mature endothelium and filled with lymph.

25.54 Littoral cell angioma, histology.



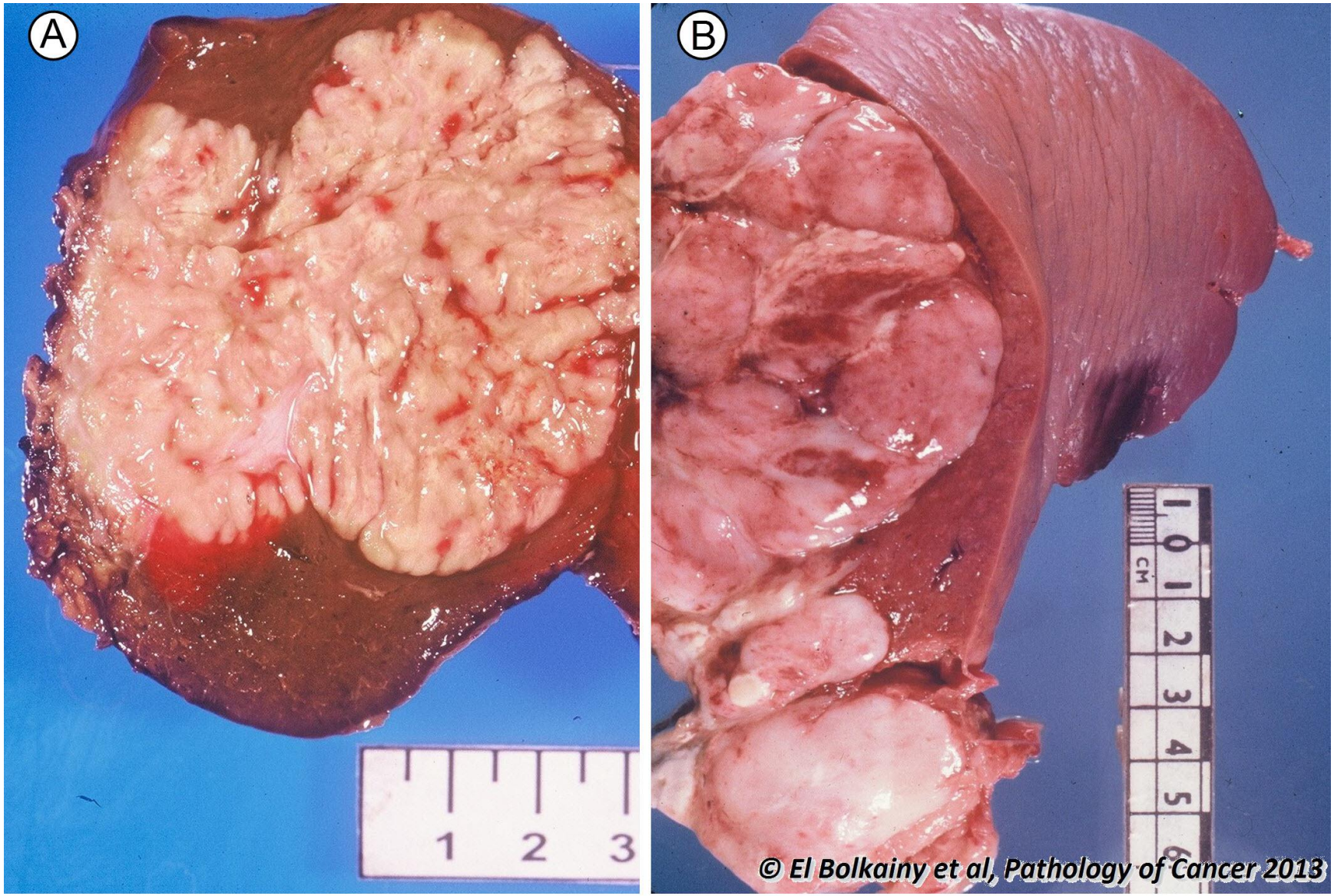
Picture 25-54 **Littoral cell angioma, histology.** Irregular vascular spaces lined by cuboidal hobnail endothelial cells. No evidence of anaplasia or mitosis. Immunostaining of endothelial cells: Factor VIII+, CD34- and CD68+.

25.55 Hodgkin lymphoma of spleen.



Picture 25-55 **Hodgkin lymphoma of spleen. A** Focal large mass, **B** or multiple nodules randomly distributed and show fibrosis.

25.56 Diffuse large B-cell non-Hodgkin lymphoma, gross features.



Picture 25-56 **Diffuse large B-cell non-Hodgkin lymphoma, gross features.** Focal large whitish mass (fish-meat appearance) and multinodular pattern distributed at random.