Gross Pathology of Lesions in the Thymic Region

6

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For cases in which the first procedure pertaining to an anterior mediastinal lesion is an attempt at excision, the pathologist may use selected macroscopic characteristics to begin the process of differential diagnosis. Invasion into attached portions of lung, pericardium, or large blood vessels is generally linked to a potential for aggressive behavior, regardless of the histotype of the proliferation. Not all lesions with such features are malignant cytologically. For example, desmoid-type fibromatosis, thymoma, and fibrosing mediastinitis may all demonstrate invasive growth. However, all of them do have the capacity to cause significant morbidity and even mortality.

On the other hand, encapsulation is generically a property of biologically indolent anterior mediastinal processes. Benign cysts of thymic, lymphatic, parathyroid, mesothelial, and bronchogenic types usually have distinct capsules, as do many thymomas and teratomas. On the other hand, it is uncommon for thymic carcinomas, malignant germ cell tumors, neuroendocrine neoplasms, and sarcomas to be invested by fibrous tissue at their peripheries, and malignant lymphomas virtually never are encapsulated.

With specific reference to cystic change, several lesions other than bona fide cysts may exhibit that attribute. These potentially include thymoma, thymic carcinoma arising in a thymic cyst, seminoma, Hodgkin lymphoma, and teratoma.

Other macroscopic findings are sometimes noteworthy points. Thymomas often are subdivided internally by broad fibrous bands that intersect one another at acute angles, whereas sclerosing lymphomas—which may sometimes otherwise simulate thymic epithelial neoplasms—exhibit indistinct fibrous trabeculation or stromal bands that connect with one another obliquely. Extensive intralesional hemorrhage and necrosis are also notable because they are generally uncommon in lymphomas and benign tumors of the mediastinum. An exception is represented potentially by thymoma, which can demonstrate extensive degenerative changes that simulate those of spontaneous necrosis.

A uniformly firm, but not hard, white-tan "fish flesh" appearance of lesional cut surfaces is also important to record. It can be present in lymphomas, sarcomas, high-grade carcinomas (especially lymphoepithelioma-like thymic carcinoma), and peculiar nonneoplastic proliferations such as Rosai-Dorfman disease and Castleman disease. Marked stromal sclerosis is a property of fibrosing mediastinitis and desmoid-type fibromatosis and can also be present in thymoma, seminoma, selected large cell lymphomas, and carcinoid tumors. Friability and global hemorrhage are seen respectively in acute tumefactive mediastinitis and mediastinal hematoma.

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6.1 Part I: Thymic Hyperplasias
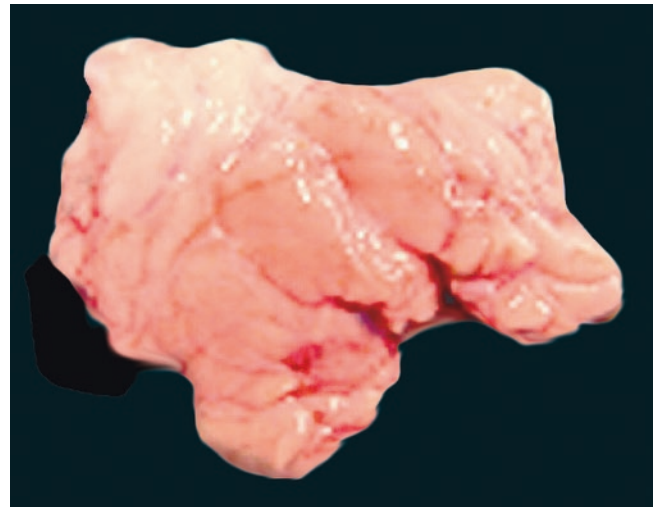(Figs. 6.1 and 6.2)

Fig. 6.2 Acquired thymic hyperplasia in adults also manifests with diffuse thymic enlargement but basic retention of a normal glandular profile, as shown here. It can be associated with totally normal histologic architecture or the presence of lymphoid hyperplasia with follicle formation. The latter finding is often seen in patients with myasthenia gravis

Fig. 6.1 True thymic hyperplasia is seen here in a newborn infant who died of sepsis. The thymus has a normal configuration but is much larger than it should be for age. Histologically, it showed a physiological composition. In the past, massive true thymic hyperplasia in infancy was termed "status thymicolymphaticus" and was thought to be a potential cause of respiratory embarrassment

6.2 Part II: Cystic Lesions of the Thymic Region and Anterior Mediastinum

(Figs. 6.3, 6.4, 6.5, 6.6, 6.7, 6.8, 6.9, 6.10, 6.11, 6.12, 6.13, and Table 6.1)
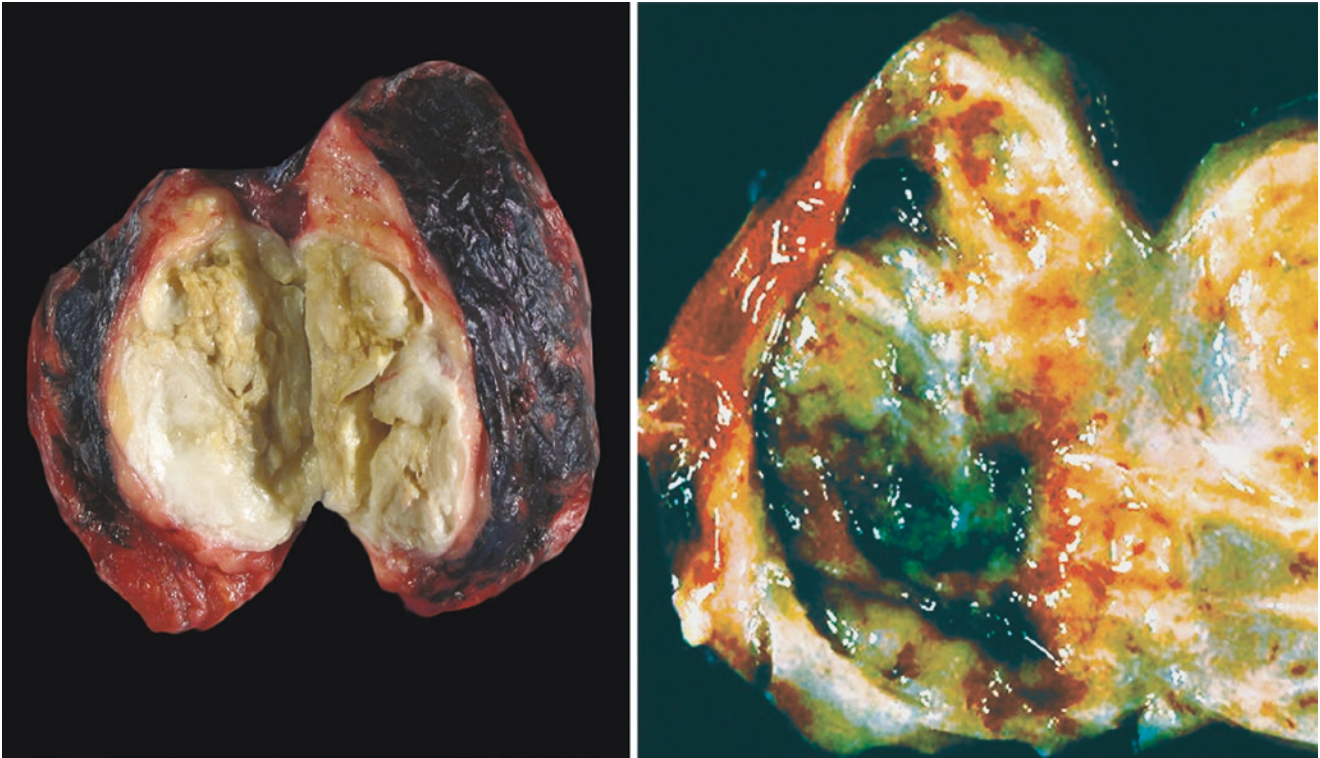
Fig. 6.3 Unilocular (congenital) thymic cysts have only one cavity, which is filled with serous or grumous-keratinaceous material. The lining epithelium is simple and indistinct in most instances, although uncommon cases show proliferation of it, forming nodules. Cholesterol deposits may sometimes be seen in the cyst wall at a macroscopic level

Fig. 6.4 Multilocular (acquired) thymic cysts contain several cavities that are bounded by fibrous septa and lined by squamoid thymic epithelium. The cyst contents may be represented by clear serous or turbid fluid. Epithelial proliferation is again a possibility in a small minority of cases
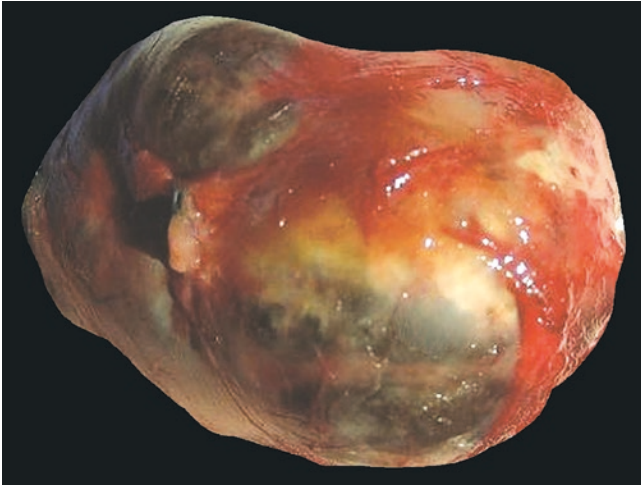
Fig. 6.5 Parathyroid cysts of the thymic region may be associated with clinical normocalcemia or hypercalcemia. In pure form, they have a single cavity filled with serous fluid and an attenuated but stratified lining epithelium composed of parathyroid chief cells

Fig. 6.6 Pericardial (mesothelial) cysts are macroscopically similar to the image described in Fig. 6.5, but their lining comprises a single layer of cytologically bland mesothelium. An attachment to the pericardium is apparent radiologically and at surgery

Fig. 6.7 Bronchogenic cysts, shown here, may be unilocular or multilocular. The cavitary spaces in such lesions contain turbid or viscous mucoid fluid, and their walls are heterogeneously solid. Microscopically, one sees a pseudostratified ciliated columnar epithelial lining, with smooth muscle or cartilage in the cyst wall
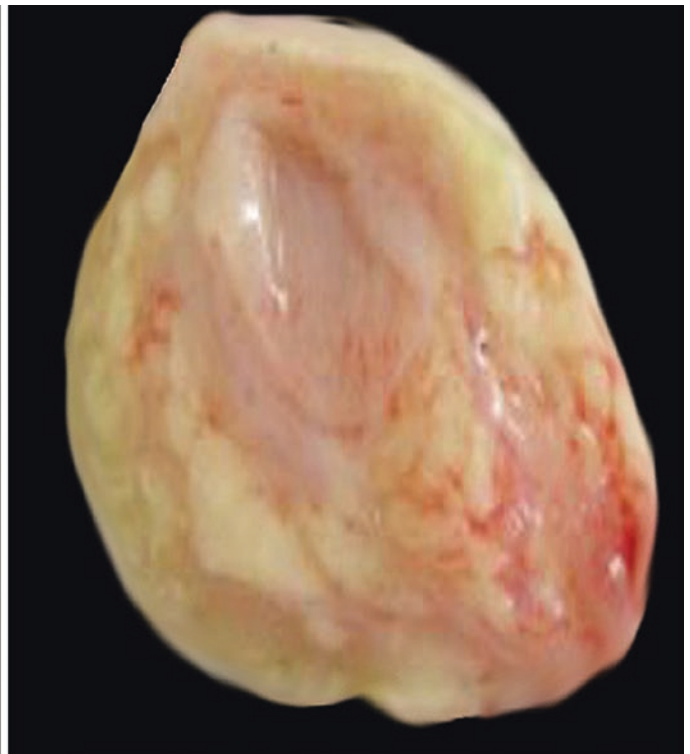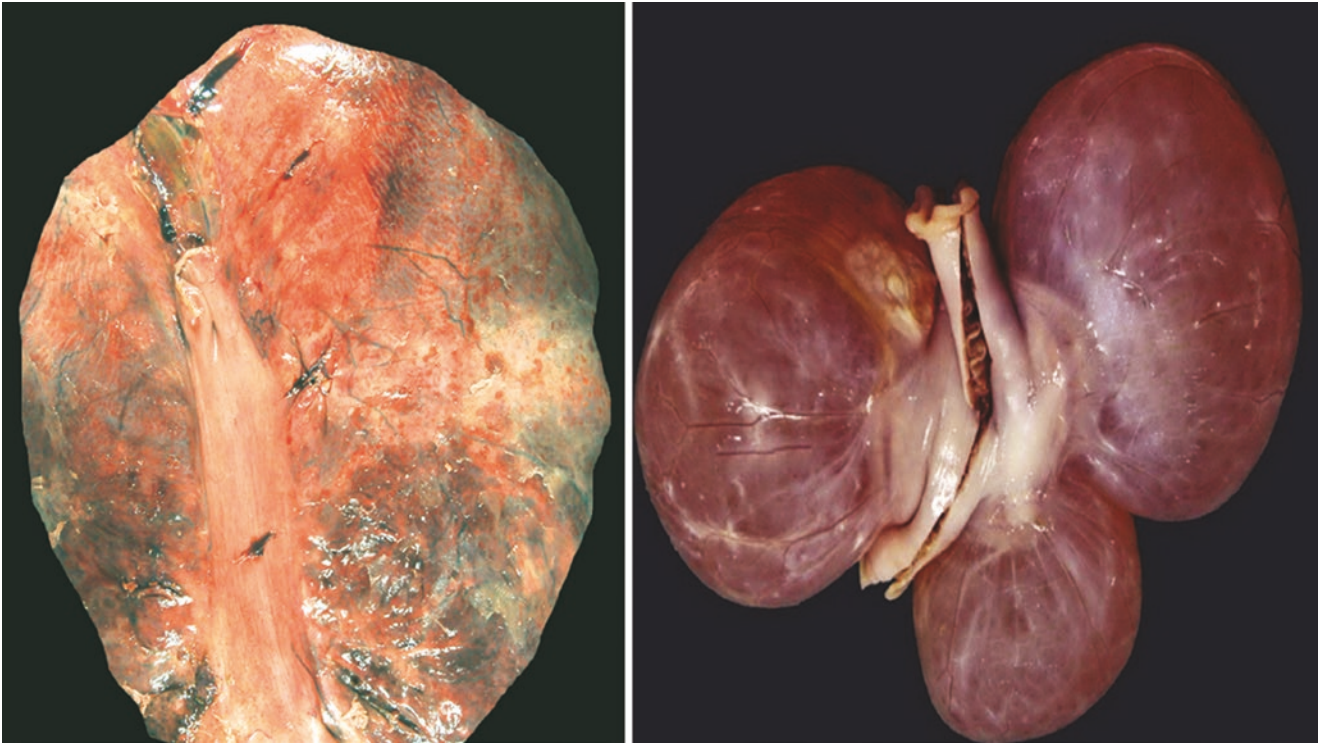
Fig. 6.8 Lymphangiomas of the thymic region may be unilocular or multilocular. They are thin walled and lined by lymphatic-type endothelium admixed with lymphoid infiltrates histologically. Cyst contents are serous or slightly turbid
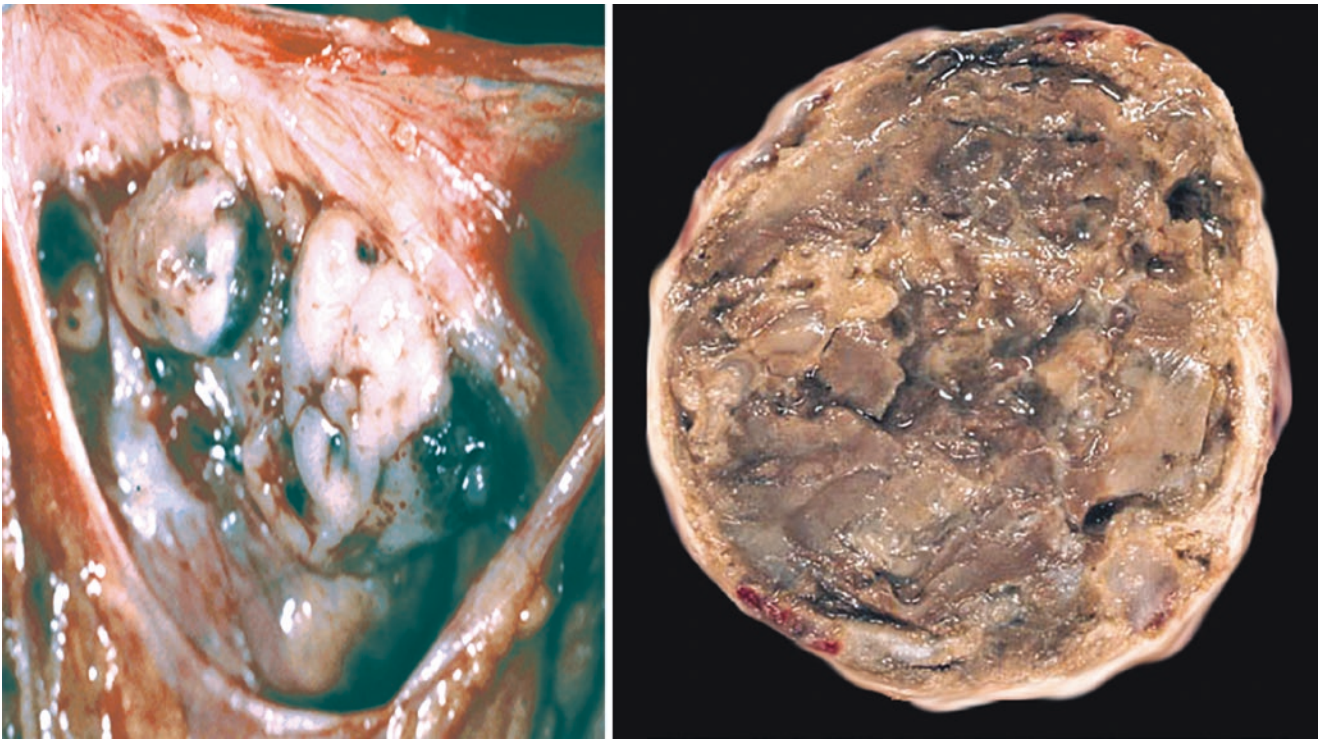
Fig. 6.9 Thymomas with cystic change may contain one or several loculated spaces. In the extreme, only a few mural nodules of thymomatous tissue are seen in the wall of a large cyst (left). Rarely, the tumor may be virtually entirely cystic, necrotic, and hemorrhagic (right), and extensive sampling of the wall is necessary to document the presence of thymoma. The latter tumors do not behave any more adversely than ordinary thymomas do

Fig. 6.10 Thymic teratomas may be mature (left) or immature (right) histologically. Both forms of this lesion contain several internal cavities of variable sizes, as well as a range of solid tissue components. The contents of the cysts are turbid or "cheesy," and differentiated structures such as hair (left), bone, or teeth may be observed grossly
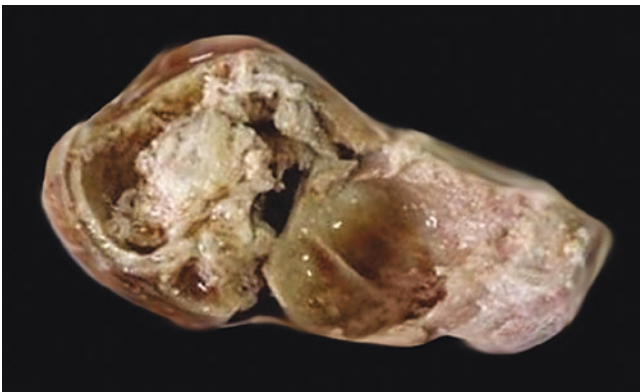
Fig. 6.11 Cystic thymic seminoma may contain one cavity or several, in which grumous, turbid, or serous fluid can be seen. The cavities contain variable amounts of solid mural tissue

Fig. 6.12 Thymic carcinoma may arise in an acquired multilocular thymic cyst, as shown here. The malignant component "overruns" the lesion and fills some cavities with solid tissue. Histologically, carcinomas in thymic cysts typically show a basaloid histologic constituency [see Chap. 9]
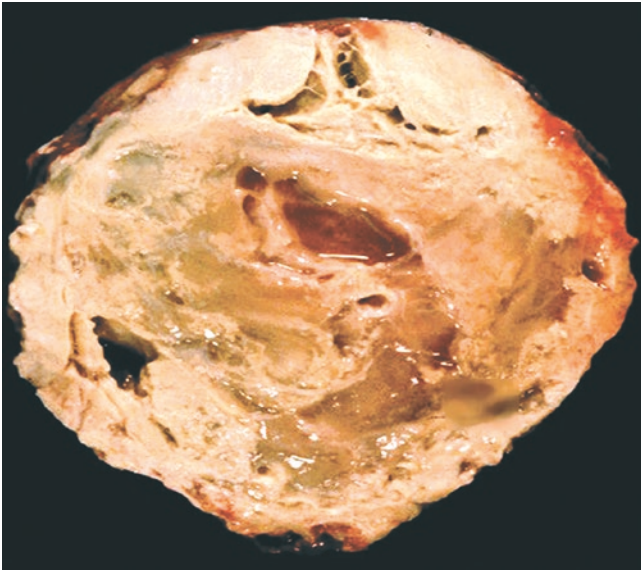
Fig. 6.13 Cystic thymic carcinoid (shown here) is rare, and the locular spaces that appear in it are relatively small. They contain serous or turbid fluid. The remainder of the mass is composed of solid, non-trabeculated, pink-tan tissue which may contain areas of necrosis and hemorrhage

Table 6.1 Macroscopic differential diagnosis of anterior mediastinal cystic lesions

Type of cyst	Contents	Loculation
Parathyroid	Serous fluid	Unilocular
Thymic	Serous or turbid fluid	Unilocular or multilocular
Bronchogenic	Viscous or turbid fluid	Unilocular or multilocular
Pericardial (mesothelial)	Serous fluid	Unilocular
Lymphangiomatous	Serous or slightly turbid fluid	Unilocular or multilocular
Cystic teratoma	Turbid or "cheesy" fluid	Multilocular
Cystic thymoma	Variable	Unilocular or multilocular
Thymic carcinoma *ex* thymic cyst	Solid, multinodular	Multilocular
Cystic seminoma	Variable	Unilocular or multilocular
Cystic carcinoid	Variable	Unilocular or multilocular

6.3   Part III: Encapsulated, Non-cystic Lesions (Figs. 6.14 and 6.15, 6.16, and 6.17)
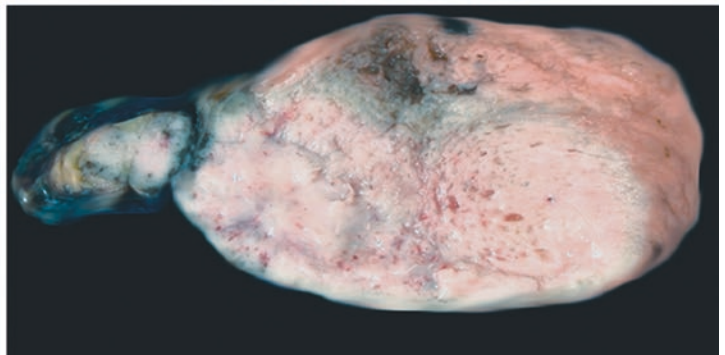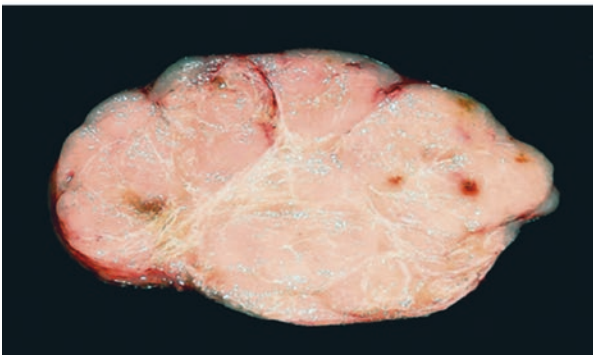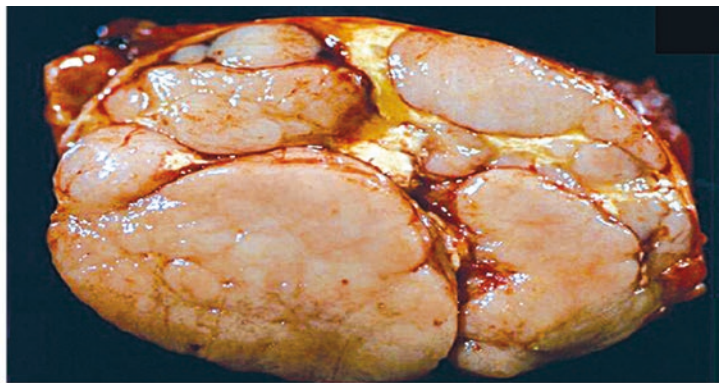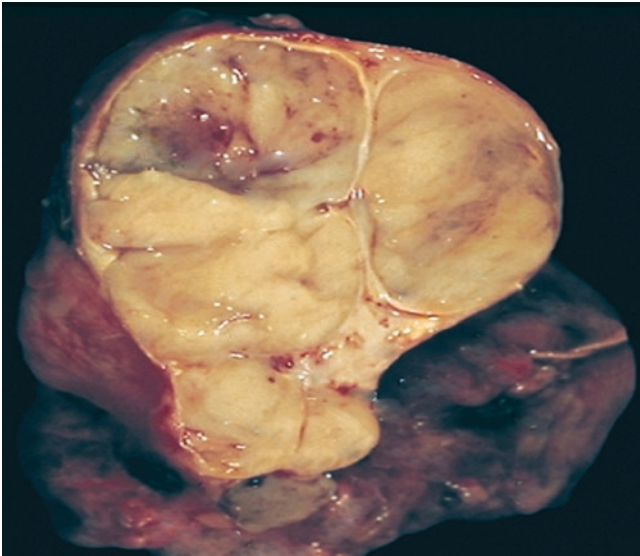
Figs. 6.14 and 6.15 Thymomas are often peripherally encapsulated, and they also show internal subdivision by fibrous septa, into lobules. Encapsulated thymomas may still occasionally recur
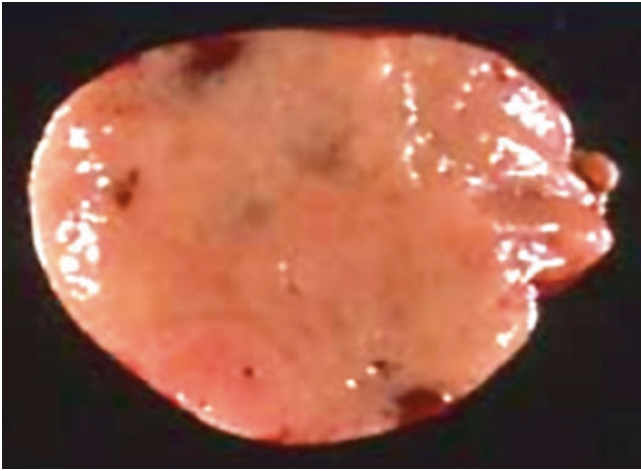
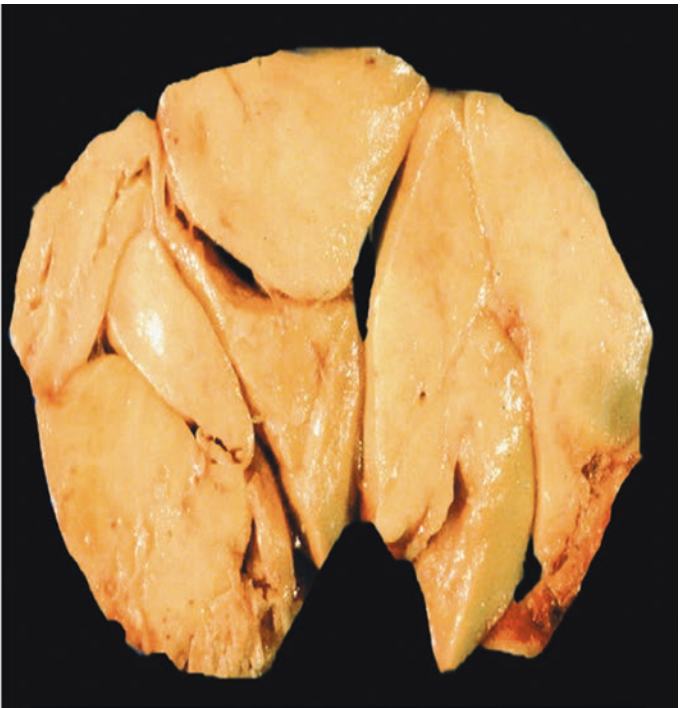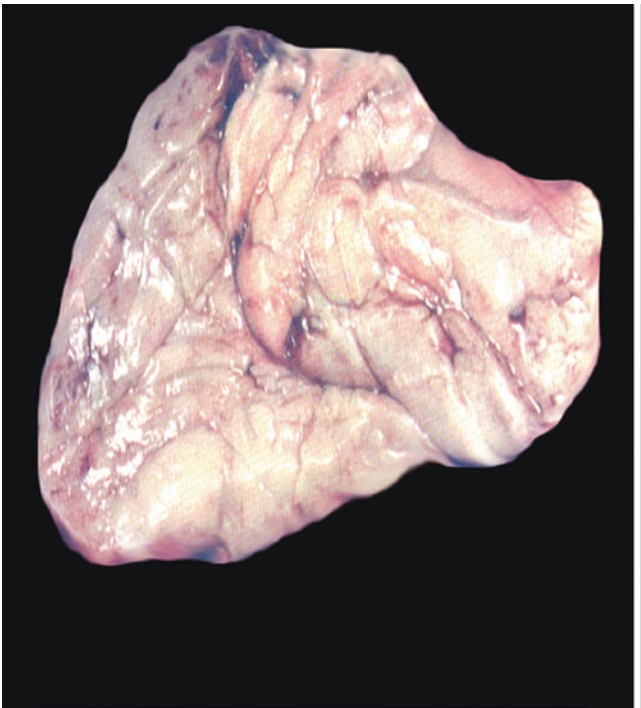**Fig. 6.16** Parathyroid adenomas have a thin peripheral capsule, and they are constituted by solid tan-pink tissue

Fig. 6.17 Thymolipomas are peculiar tumors that generally retain the overall external configuration of the thymus, complete with a peripheral capsule. However, they are much larger than normal or even hyperplas-tic thymuses, with a yellow color caused by abundant adipose tissue that is admixed with thymic parenchyma microscopically

6.4 Part IV: Unencapsulated, Solid Masses Containing Multiple Foci of Hemorrhage and Necrosis

(Figs. 6.18, 6.19, 6.20, 6.21, 6.22, 6.23, and 6.24)

Fig. 6.19 Plasmacytoma of the thymic region, comprising multiple solid nodules with internal hemorrhage and necrosis

Fig. 6.18 Mixed embryonal carcinoma-yolk sac carcinoma of the thymus, showing a heterogeneous solid consistency with several foci of hemorrhage and necrosis
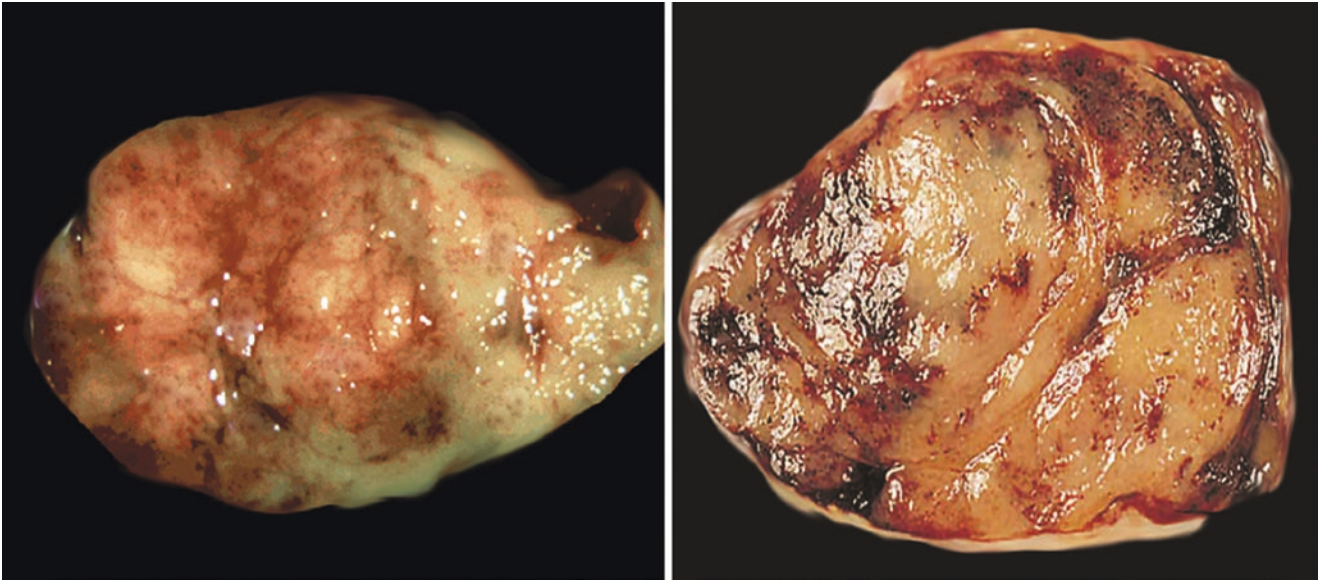
Fig. 6.20 Thymic carcinoid lacks internal septation and manifests areas of necrosis and hemorrhage
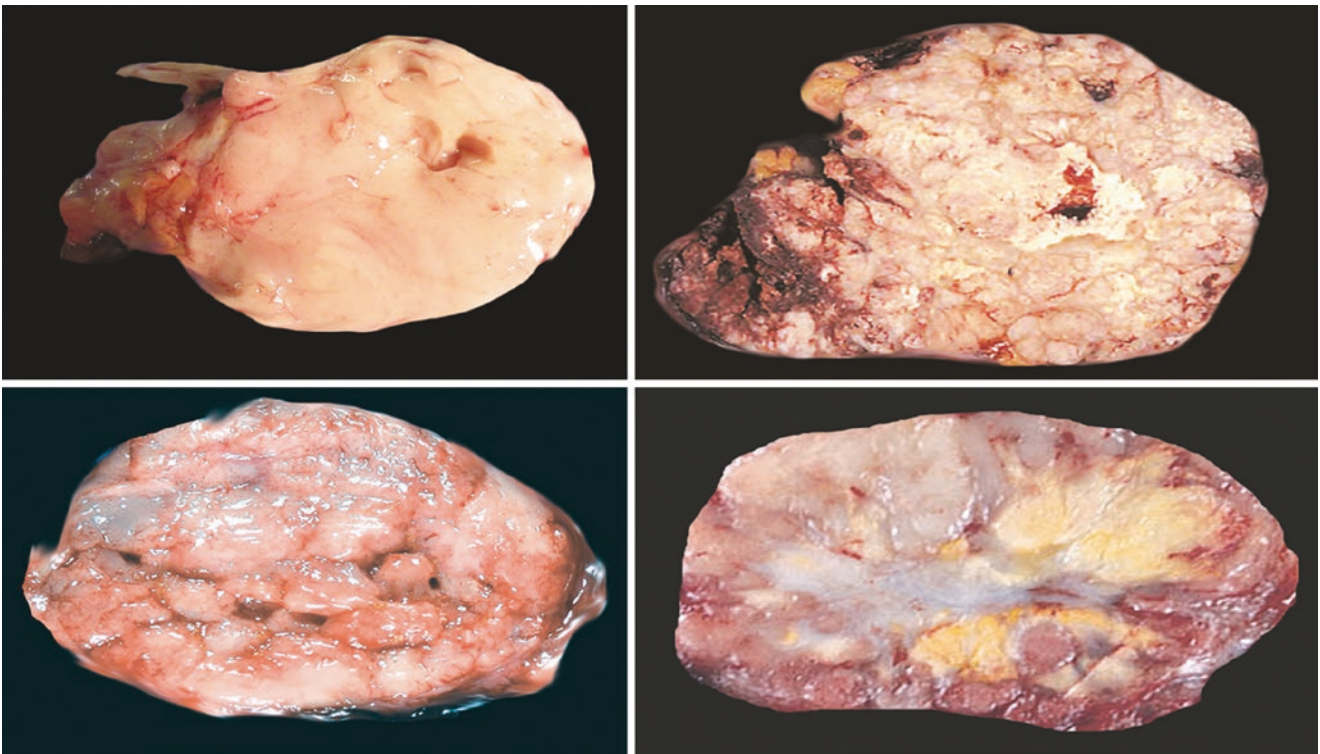
Fig. 6.21 Non-neuroendocrine thymic carcinomas have gross appearances which mirror those of thymic carcinoids. Clockwise from the top left of this photograph, they are represented by lymphoepithelioma-like carcinoma, poorly differentiated squamous carcinoma (which may show a *NUT* gene mutation in some instances), sarcomatoid carcinoma, and papillary carcinoma
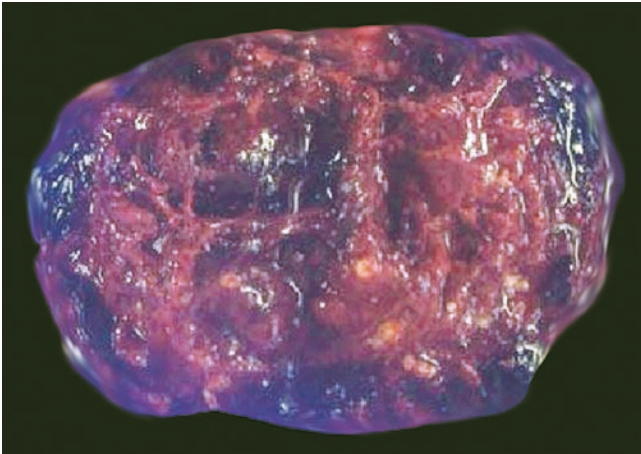
Fig. 6.22 Primary thymic choriocarcinoma is a markedly hemorrhagic and necrotic solid tumor
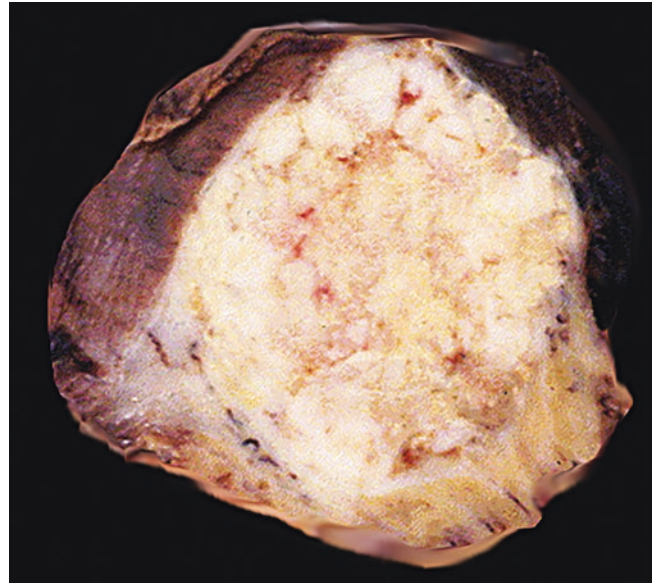
Fig. 6.24 This parathyroid carcinoma of the thymus contains several small foci of necrosis grossly. These tumors may also be widely infiltrative into perithymic soft issue in some cases
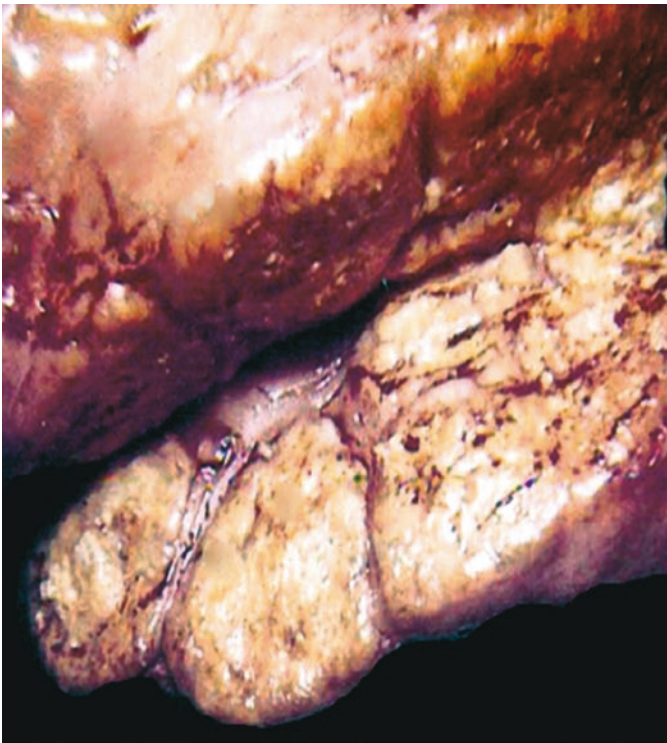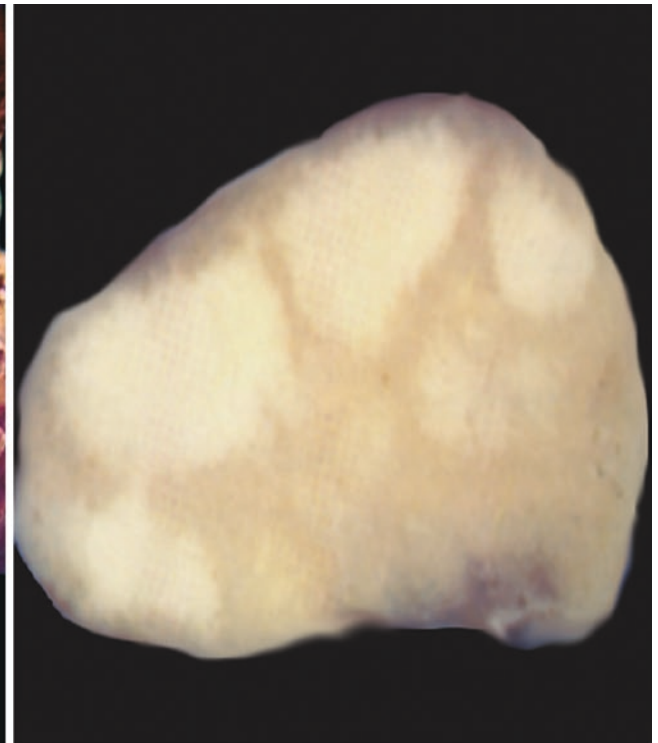

Fig. 6.23 Tumefactive tuberculous lymphadenitis of the thymic region demonstrates regional foci of necrosis in the context of lymphadenopathy

6.5   Part V: Solid Masses with a Homogeneous Cut Surface Resembling "Fish Flesh" (Figs. 6.25–6.34)

Other solid, unencapsulated masses in the thymic region have white-tan or tan-pink cut surfaces that resemble "fish flesh." They are potentially represented by Castleman dis-ease (Fig. 6.25), Hodgkin lymphoma (Fig. 6.26), non-Hodgkin lymphomas of the large B-cell type (Fig. 6.27) and lymphoblastic type (Fig. 6.28), neuroblastoma (Fig. 6.29), paraganglioma (Fig. 6.30), primitive neuroec-todermal tumor (Fig. 6.31), rhabdomyosarcoma (Fig. 6.32), Rosai-Dorfman disease (Fig. 6.33), and seminoma (Fig. 6.34) .
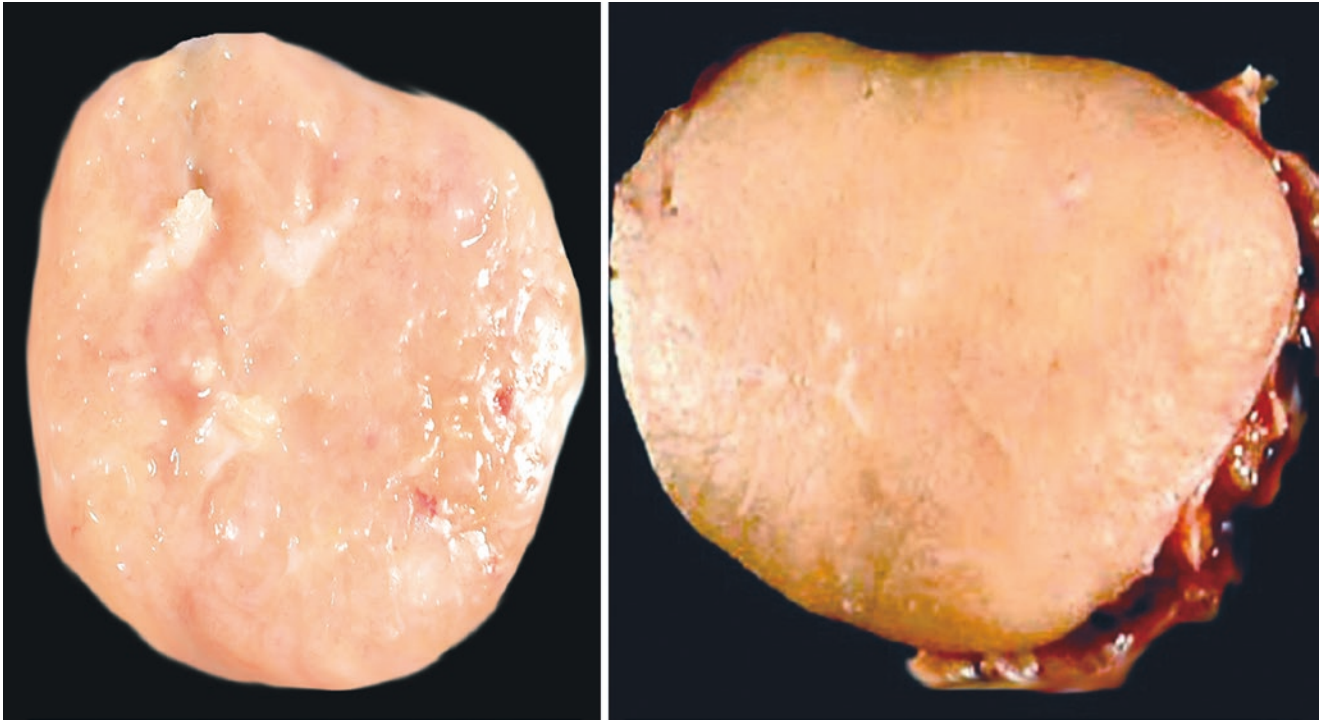
Fig. 6.25   Castleman disease of the thymic region
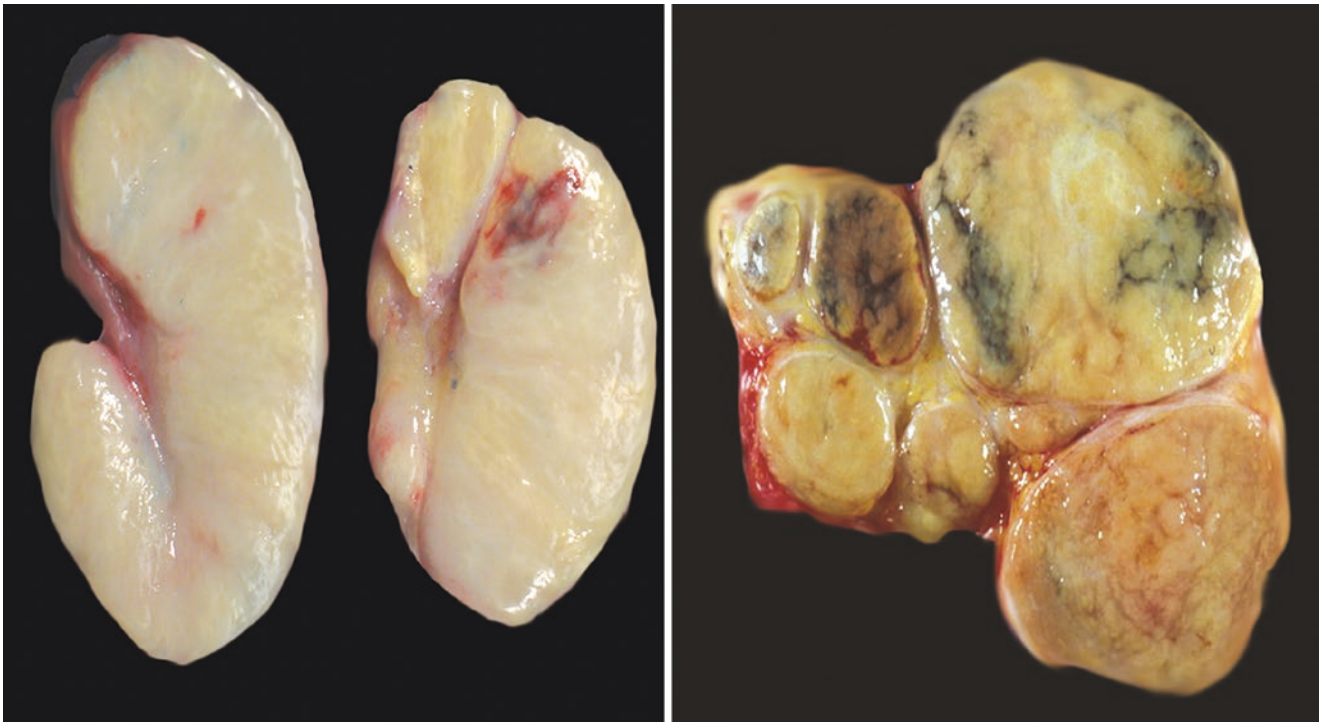
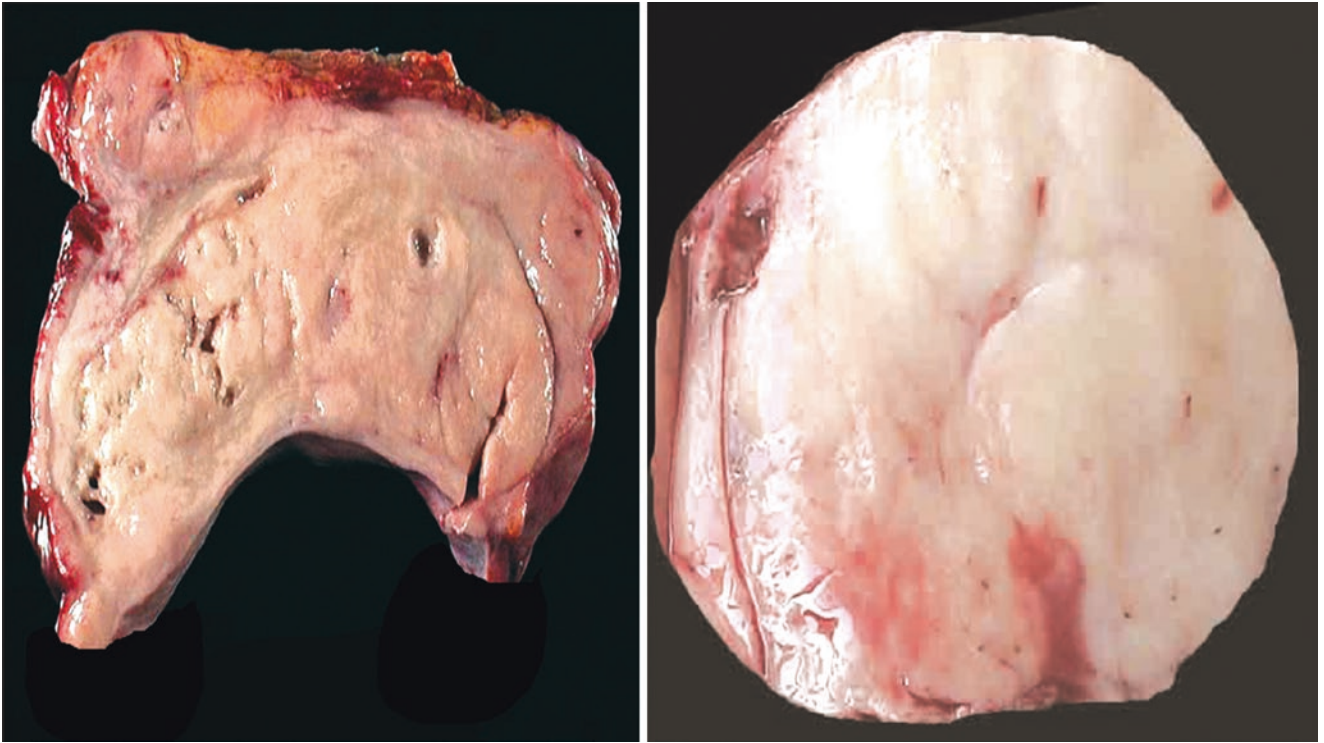**Fig. 6.26**   Hodgkin lymphoma of the anterior mediastinum

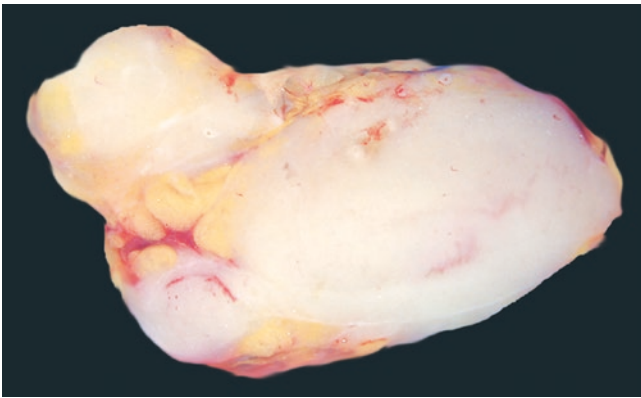**Fig. 6.27** Large-cell B-cell lymphoma of the thymus

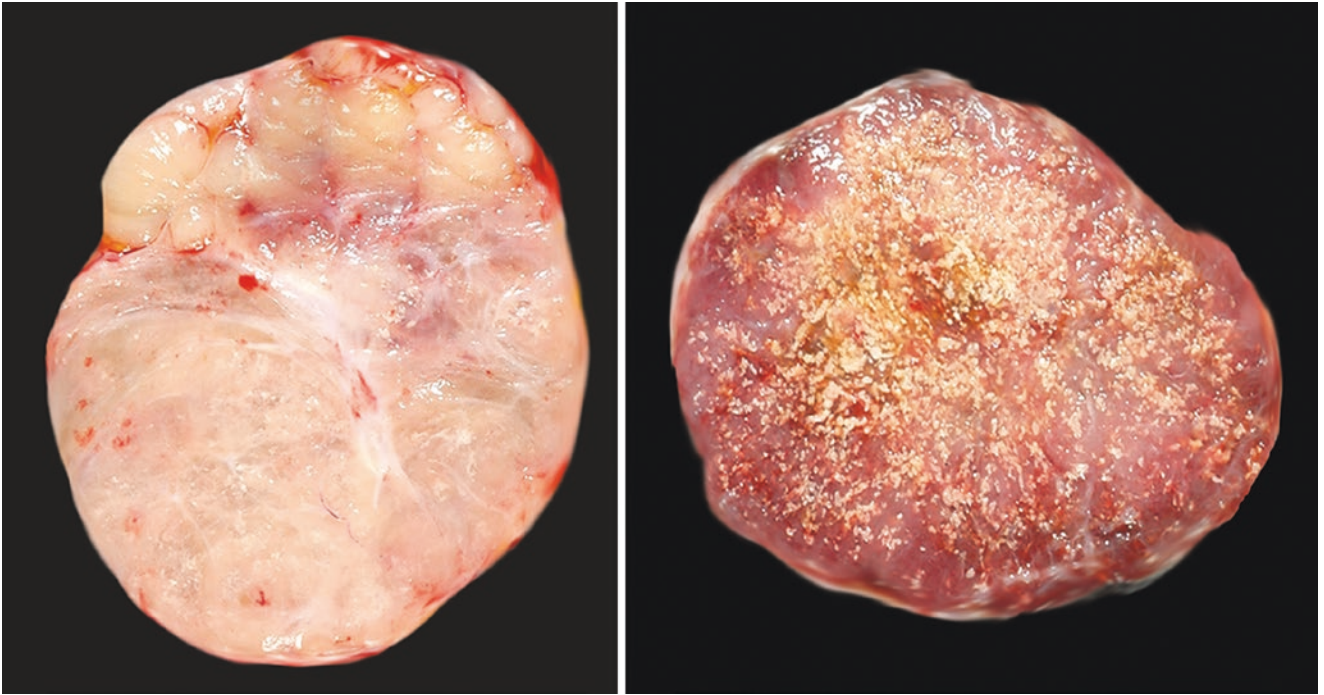**Fig. 6.28** Lymphoblastic lymphoma of the thymic region

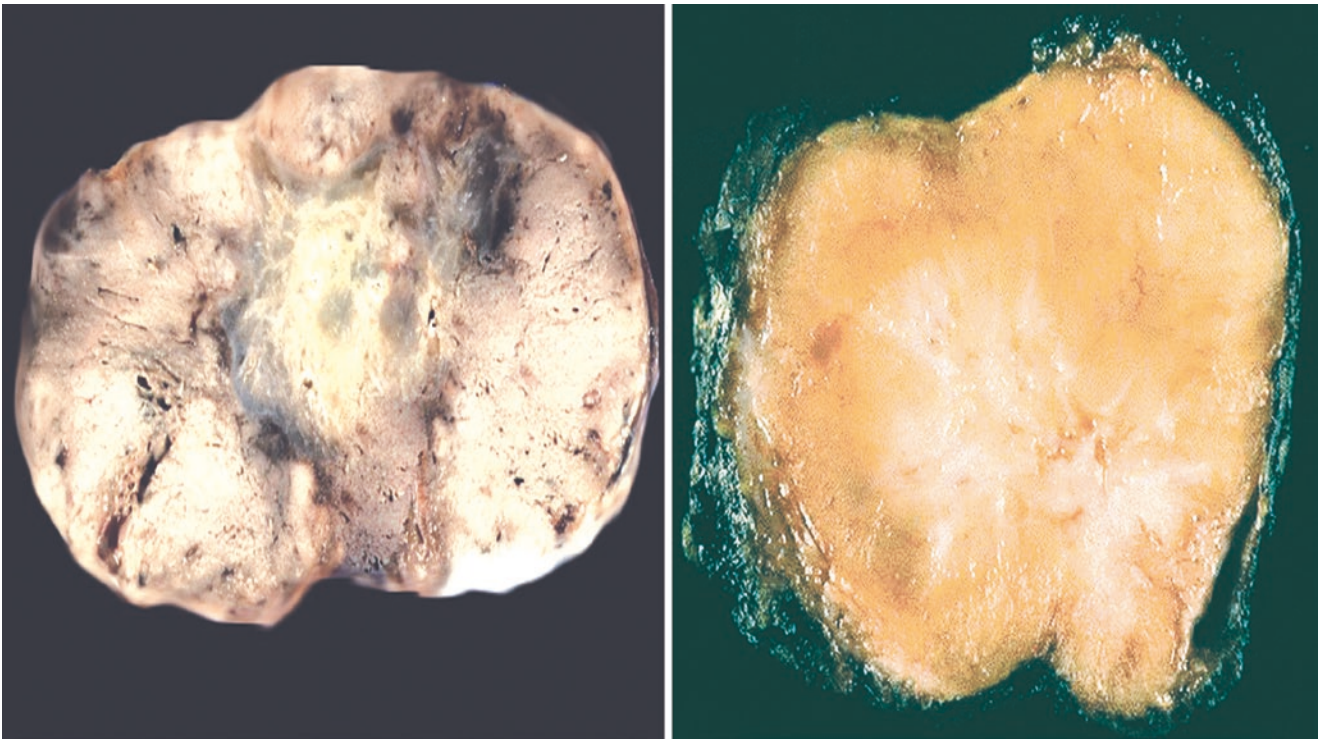**Fig. 6.29** Neuroblastoma of the mediastinum, demonstrating internal foci of necrosis

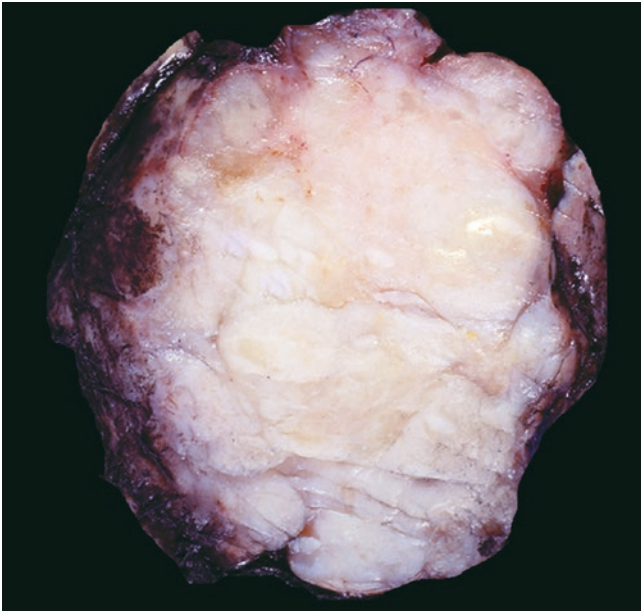**Fig. 6.30** Paraganglioma of the anterior mediastinum

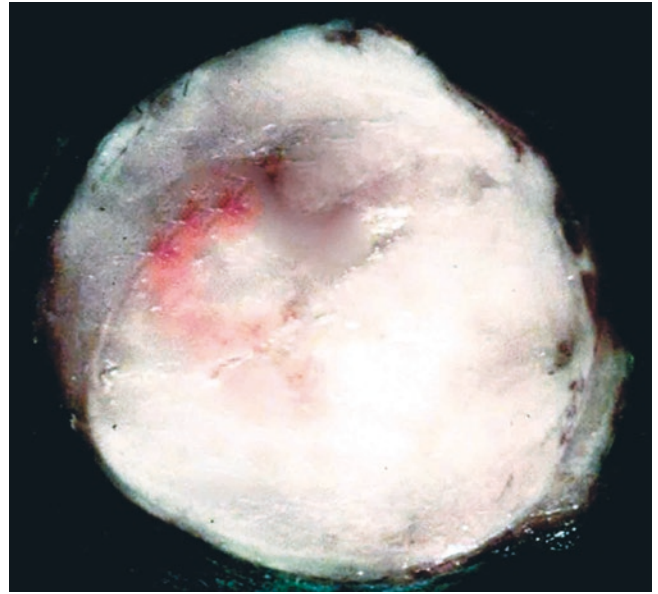**Fig. 6.31** Primitive neuroectodermal tumor of the thymic region

Fig. 6.33 Rosai-Dorfman disease (sinus histiocytosis with massive lymphadenopathy) of the thymic region
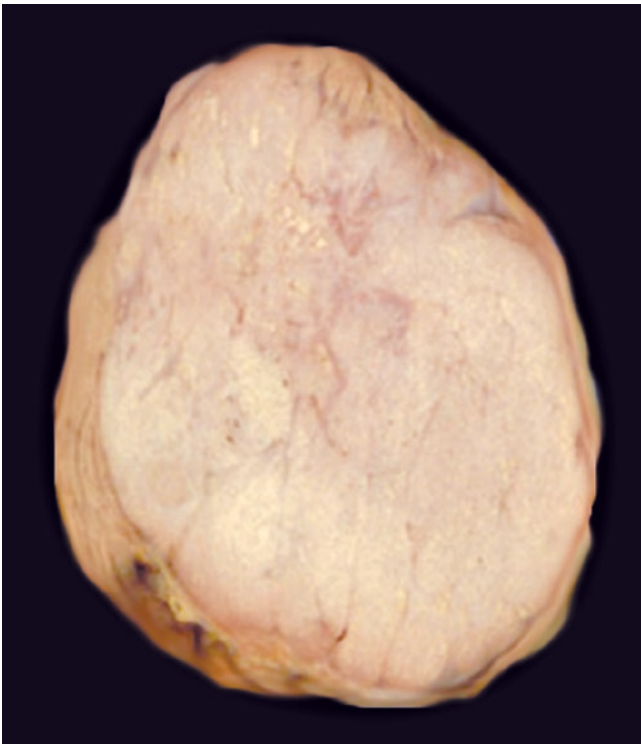

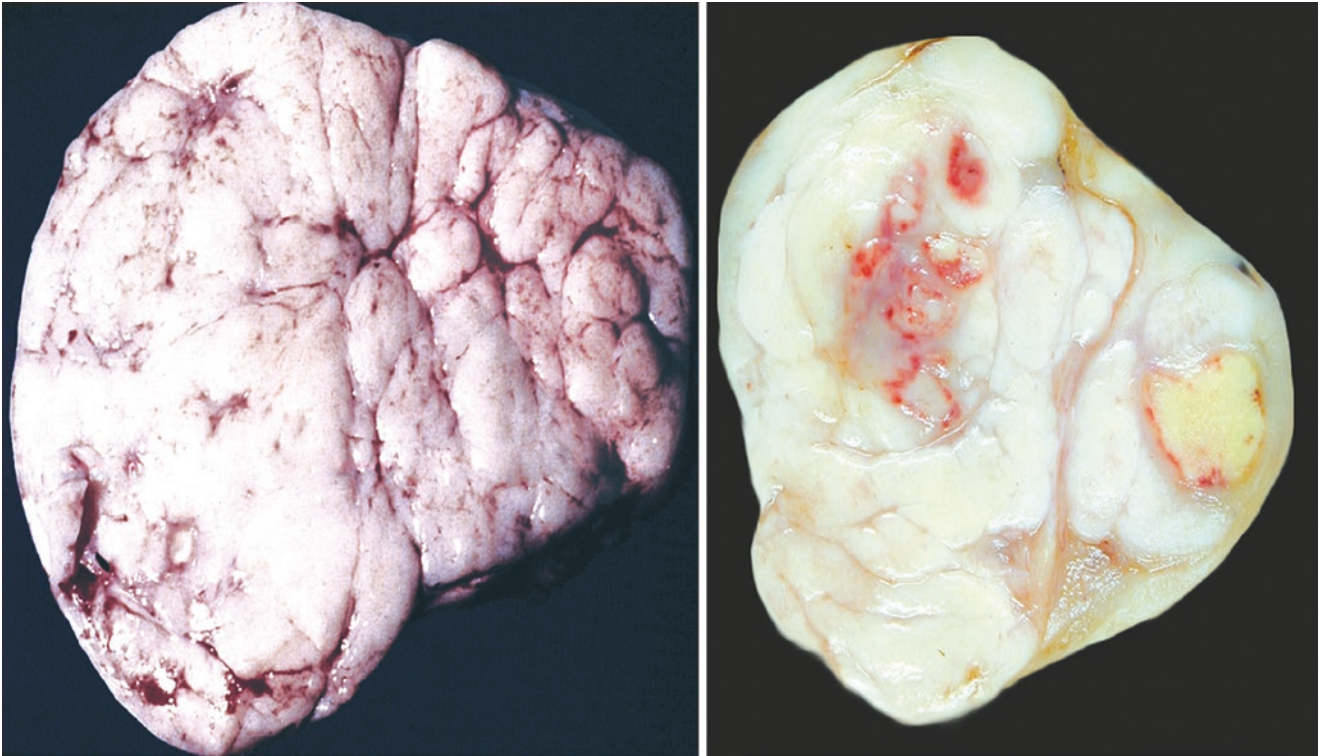**Fig. 6.32** Alveolar rhabdomyosarcoma of the anterior mediastinum

Fig. 6.34 Seminoma of the thymic region

6.6 Part VI: Solid Unencapsulated Masses with a "Gritty" or Fibrous Cut Surface (Figs. 6.35–6.38)

Anterior mediastinal lesions with this characteristic are potentially represented by desmoid-type fibromatosis (Fig. 6.35), solitary fibrous tumor (Fig. 6.36), synovial sarcoma (Fig. 6.37), and fibrosing mediastinitis (Fig. 6.38).
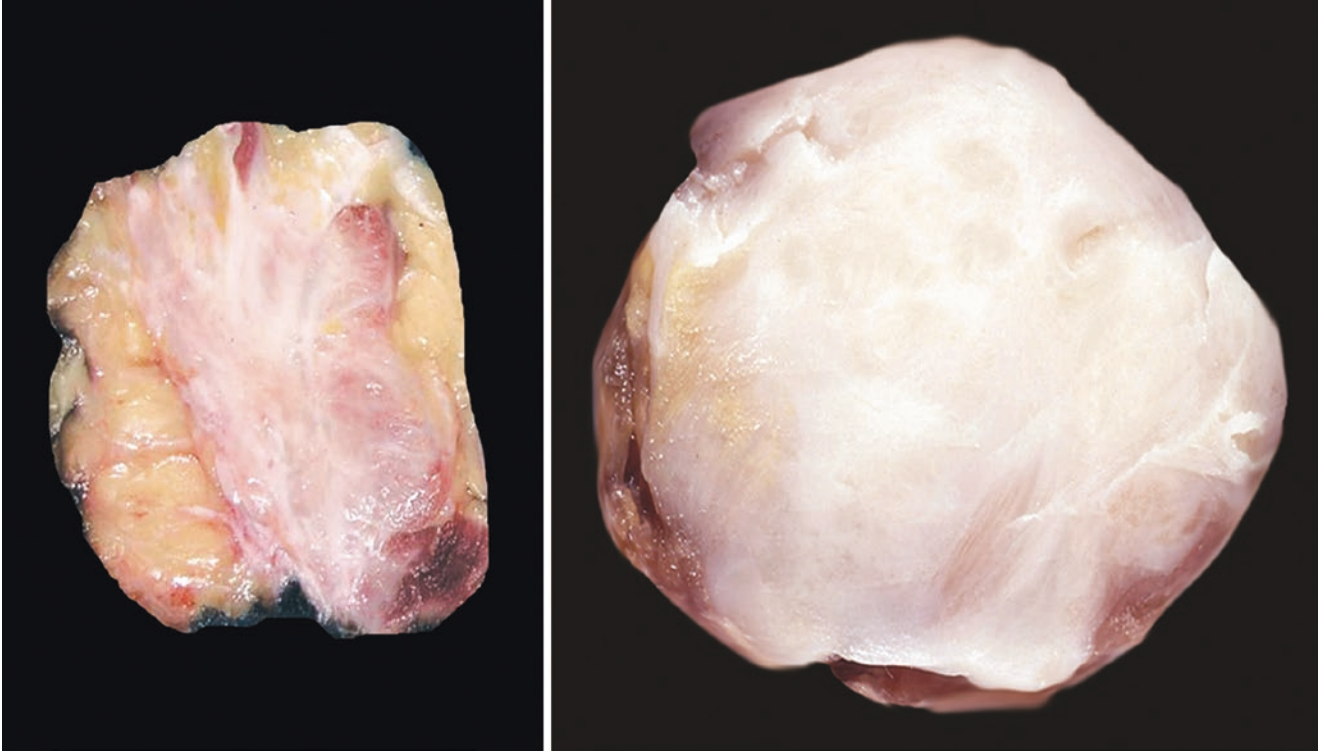

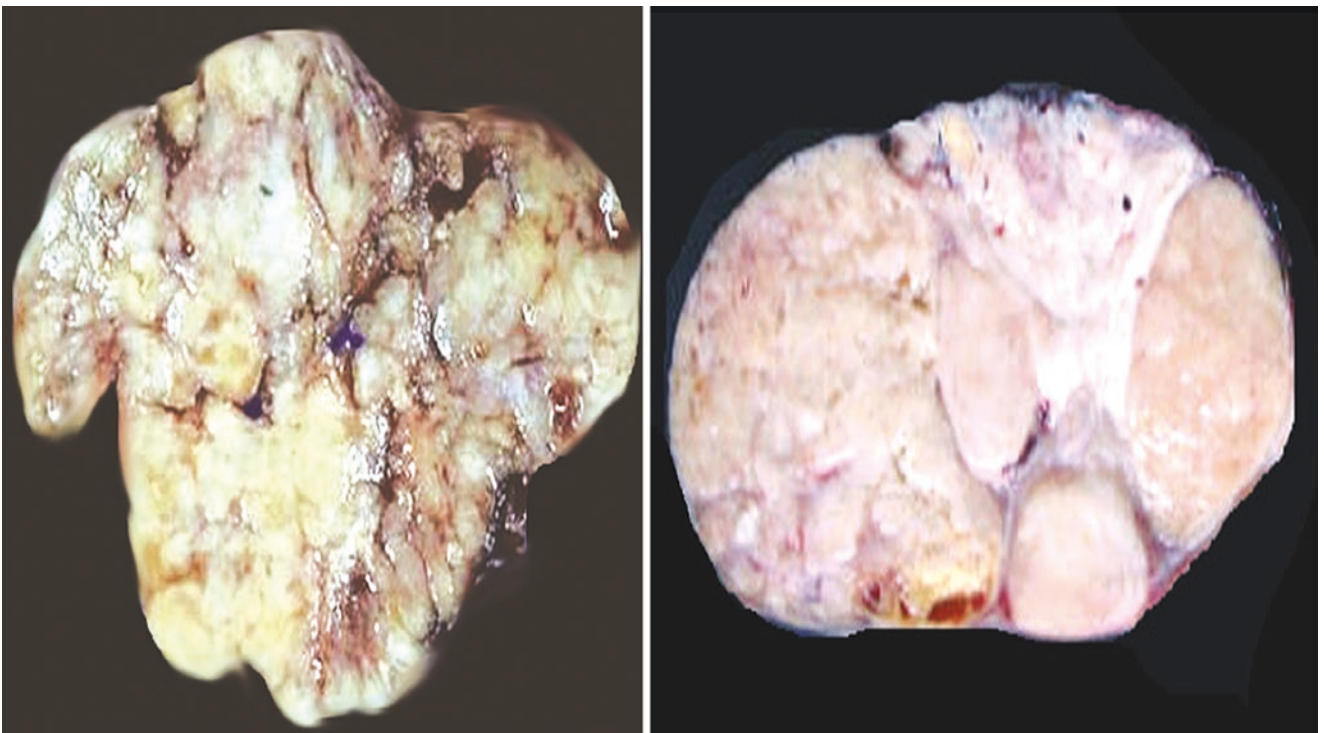**Fig. 6.35** Desmoid-type fibromatosis of the anterior mediastinum

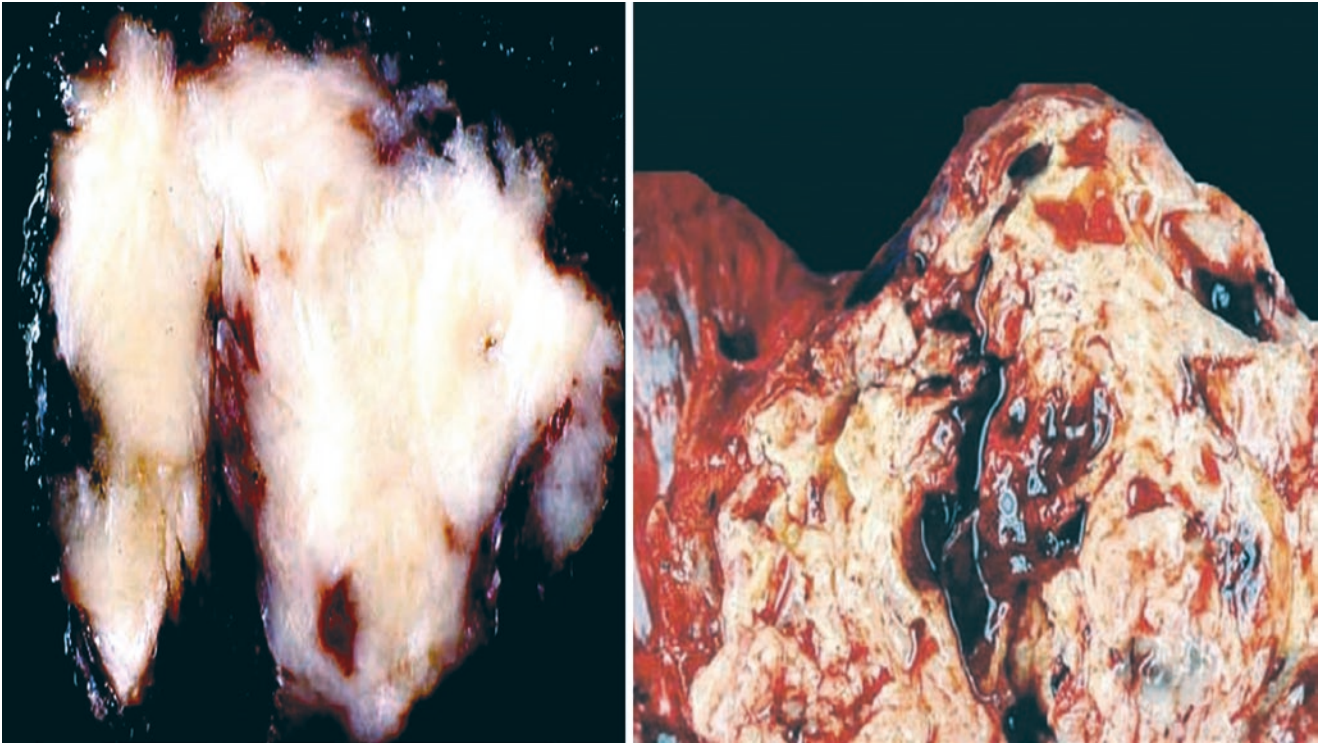

Fig. 6.36 Solitary fibrous tumor of the thymic region
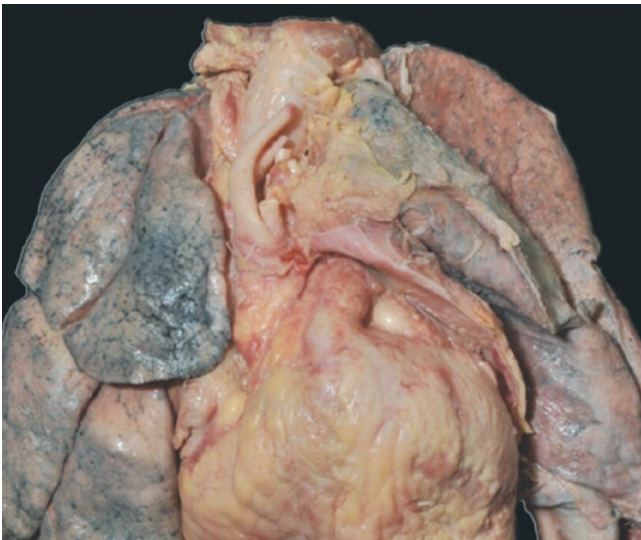
Fig. 6.37 Mediastinal synovial sarcoma

Fig. 6.38 Fibrosing (sclerosing) mediastinitis

6.7 Part VII: Anterior Mediastinal Masses with Miscellaneous Appearances, Not Previously Listed (Fig. 6.39, 6.40, 6.41, 6.42, 6.43, and 6.44)
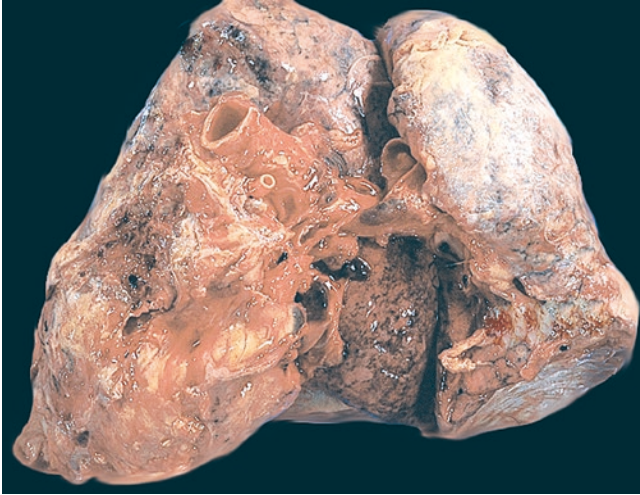

Fig. 6.39 The fibroinflammatory exudate in acute anterior mediastinitis may produce a mass. It is friable and whitish yellow in character and is relatively easily detached from the adjacent thymus and pericardium (autopsy specimen)

Fig. 6.41 Another peculiar variant of thymoma is diffusely white and sclerotic, owing to the presence of marked stromal fibrosis
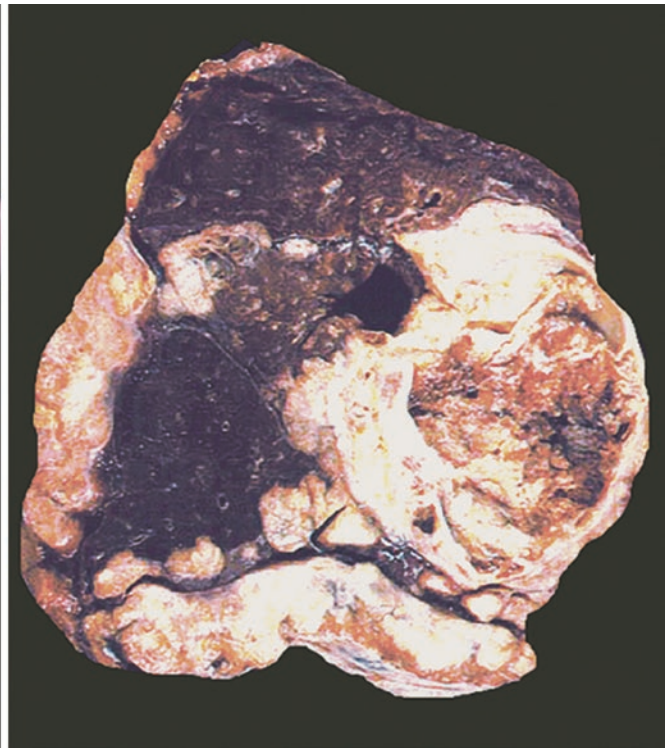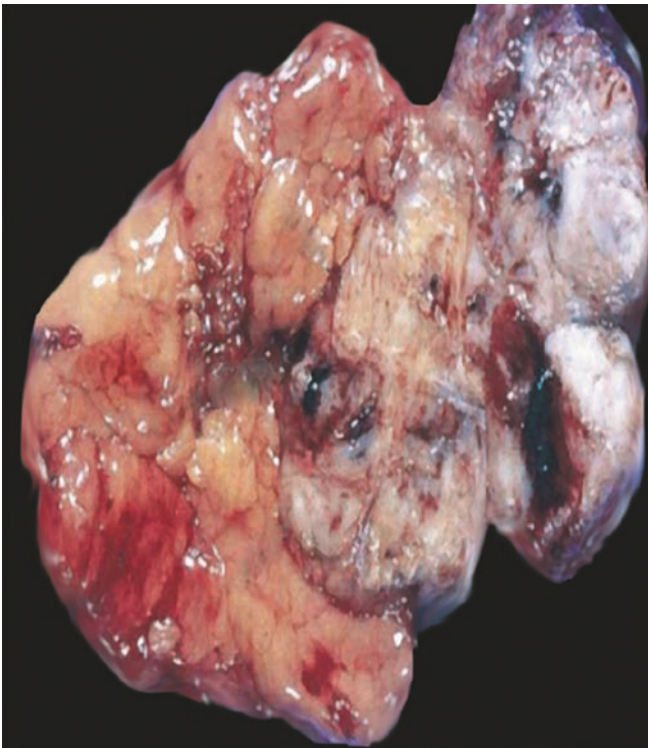

Fig. 6.40 Thymoma may show wholesale invasion of perithymic soft tissue or adjacent organs such as the lungs, pericardium, and great vessels (left panel). Rarely, it may seed the pleural surfaces diffusely, imitating the gross appearance of mesothelioma (right panel)
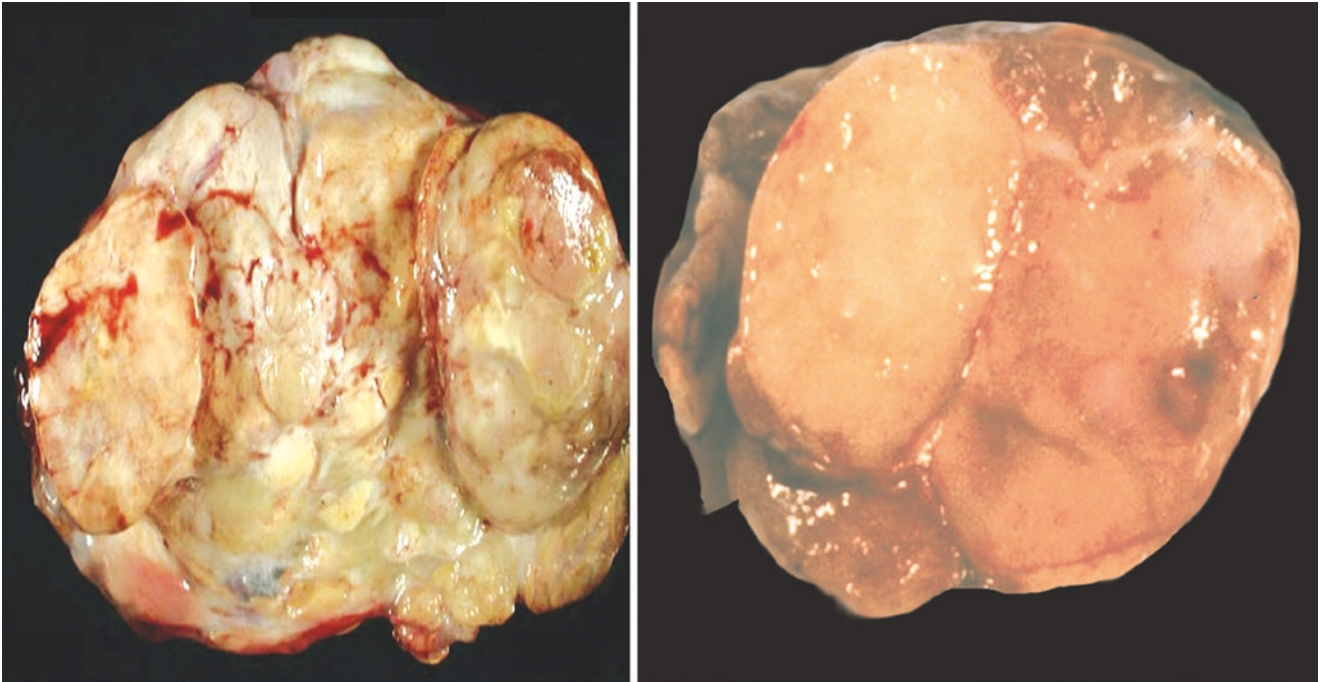
Fig. 6.42 Liposarcomas of the thymic region are unencapsulated, with a variably firm, yellow cut surface
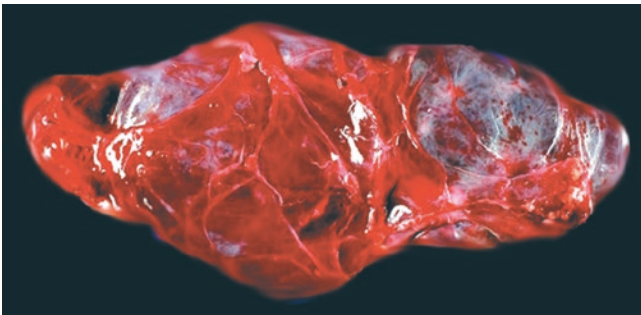

Fig. 6.43 Anterior mediastinal hematomas comprise clotted blood that is deep red and friable
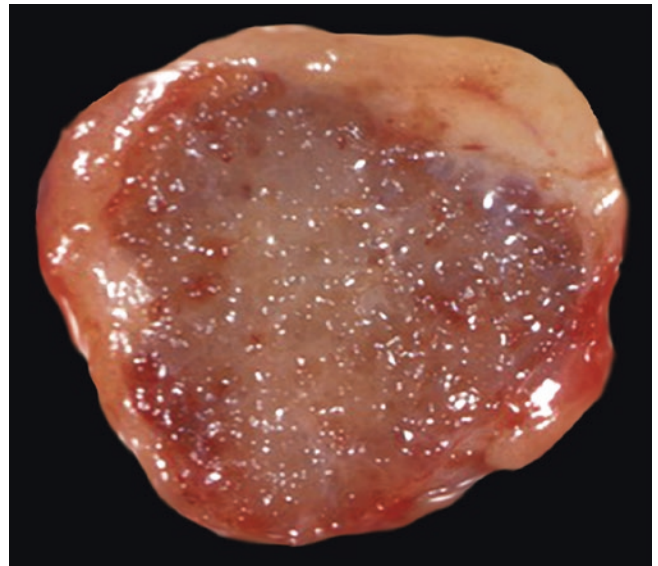

Fig. 6.44 A macroscopically singular variant of thymic carcinoma is the mucinous type, with a translucent and gelatinous cut surface

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