

Tiroid Bezinin Nadir Tümörleri ve Tiroide Metastazlar

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Özet

Tiroid bezinde follikül epiteli ve C-hücre kökenli tümörlere ek olarak, epitelyal, mezenkimal, germ hücreli, lenfohematoid kökenli primer ve sekonder tümörler de gelişebilmektedir. Mukoepidermoid karsinom, skuamöz karsinom, müsinöz karsinom, mikst medüller-folliküler karsinom, timik diferansiyasyon gösteren tümörler, paraganglioma, vasküler ve düz kas hücreli tümörler, periferik sinir kılıfı tümörleri, lenfoma, Langerhans hücreli histiositoz, dendritik hücreli tümörler ve teratom bezin nadir görülen primer tümörleridir. Bu tümörlerin her birinin tiroid maligniteleri içinde görülme sıklığı %0.5-1'in altındadır. Genellikle spesifik klinik, biyokimyasal ve radyolojik bulguları yoktur, ancak skuamöz hücreli karsinom gibi agresif tümörlerde boyunda ani büyüyen kitle veya bası bulguları ile prezentasyon tipiktir. Ayırıcı tanıda ince iğne aspirasyon biyopsisinin yararı kısıtlıdır. Çoğu olguda sitolojik bulgular tanısal değildir. Kesin tanıda altın standart patolojik ve immünohistokimyasal incelemedir.

Tiroid bezi malignitelerinin %2-3'ü sekonder tümörlerdir. Tiroid bezine en sık metastaz yapan tümörler; renal hücreli, akciğer, kolorektal ve meme karsinomlarıdır. Genellikle primer tümörün evreleme ve takibi sırasında tanı konulsa da, %20-40 olguda tiroid metastazı saptandığında primer tümör okülttür. Bilinen malignitesi olan her hastada, tiroid nodülü saptandığında ince iğne aspirasyon biyopsisi ile ayırıcı tanı sağlanmalıdır. İnce iğne aspirasyon biyopsisinin metastazları saptamada duyarlılık ve özgüllüğü %90'ın üzerindedir. Tedavi primer tümörün evre ve yaygınlığına göre planlanmalıdır. Agresif ve yaygın metastatik tümörlerin tiroid bezi metastazlarında radikal cerrahi yaklaşım gereksizdir. Beklenen sağkalım uzun ve metastaz izole ise tiroidektomi uzun dönem hastalık kontrolünde etkin olabilir.

Kaynaklar

- Vander JB, Gaston EA, Dawber TR. The significance of nontoxic thyroid nodules. Final report of a 15-year study of the incidence of thyroid malignancy. *Annals of internal medicine*. 1968;69:537-540.
- Banks ND, Kowalski J, Tsai HL, et al. A diagnostic predictor model for indeterminate or suspicious thyroid FNA samples. *Thyroid : official journal of the American Thyroid Association*. 2008;18:933-941.
- Brander A, Viikinkoski P, Nickels J, Kivisaari L. Thyroid gland: US screening in a random adult population. *Radiology*. 1991;181:683-687.
- Mortensen JD, Woolner LB, Bennett WA. Gross and microscopic findings in clinically normal thyroid glands. *The Journal of clinical endocrinology and metabolism*. 1955;15:1270-1280.
- Lloyd RV, Osamura RY, Klöppel G, Rosai J (eds) (2017) WHO classification of tumours of endocrine organs, 4th edn. IARC Press, Lyon
- DeLellis RA, Lloyd RV, Heitz PU, Eng C. Pathology and genetics of tumours of Endocrine Organs. (2004) IARC Press, Lyon
- Chintamani, Kulshreshtha P, Singh J, et al. Is an aggressive approach justified in the management of an aggressive cancer--the squamous cell carcinoma of thyroid? *International seminars in surgical oncology : ISSO*. 2007;4:8.
- Cho JK, Woo SH, Park J, Kim MJ, Jeong HS. Primary squamous cell carcinomas in the thyroid gland: an individual participant data meta-analysis. *Cancer medicine*. 2014;3:1396-1403.
- Syed MI, Stewart M, Syed S, et al. Squamous cell carcinoma of the thyroid gland: primary or secondary disease? *The Journal of laryngology and otology*. 2011;125:3-9.
- Eom TI, Koo BY, Kim BS, et al. Coexistence of primary squamous cell carcinoma of thyroid with classic papillary thyroid carcinoma. *Pathology international*. 2008;58:797-800.
- LiVolsi VA, Merino MJ. Squamous cells in the human thyroid gland. *The American journal of surgical pathology*. 1978;2:133-140.
- Lichiardopol C, Surlin V, Foarfa MC, Ghilusi MC, Bondari S. Primary squamous cell carcinoma of the thyroid: a case report. *Romanian journal of morphology and embryology = Revue roumaine de morphologie et embryologie*. 2016;57:831-836.
- Yoshihiro T, Tsuchihashi K, Kusaba H, et al. Cardiac metastasis of squamous cell carcinoma of the thyroid gland with severe disseminated intravascular coagulation: A case report. *Molecular and clinical oncology*. 2017;6:91-95.
- Tunio MA, Al Asiri M, Fagih M, Akasha R. Primary squamous cell carcinoma of thyroid: a case report and review of literature. *Head & neck oncology*. 2012;4:8.
- Booya F, Sebo TJ, Kasperbauer JL, Fatourechi V. Primary squamous cell carcinoma of the thyroid: report of ten cases. *Thyroid : official journal of the American Thyroid Association*. 2006;16:89-93.
- Wang XN, Wang SJ, Pandey V, et al. Trefoil factor 3 as a novel biomarker to distinguish between adenocarcinoma and squamous cell carcinoma. *Medicine*. 2015;94:e860.
- Zhang YX, Zhang B, Wu YH, et al. [Primary squamous cell carcinoma of the thyroid: retrospective analysis of 28 cases]. *Zhonghua er bi yan hou tou jing wai ke za zhi = Chinese journal of otorhinolaryngology head and neck surgery*. 2013;48:143-147.
- Shrestha M, Sridhara SK, Leo LJ, Coppit GL, 3rd, Ehrhardt NM. Primary squamous cell carcinoma of the thyroid gland: a case report and review. *Head & neck*. 2013;35:E299-303.
- Dresner SM, Lamb PJ, Bennett MK, Hayes N, Griffin SM. The pattern of metastatic lymph node dissemination from adenocarcinoma of the esophagogastric junction. *Surgery*. 2001;129:103-109.
- Ito Y, Hirokawa M, Higashiyama T, et al. Biological behavior of papillary carcinoma of the thyroid including squamous cell carcinoma components and prognosis of patients who underwent locally curative surgery. *Journal of thyroid research*. 2012;2012:230283.
- Cook AM, Vini L, Harmer C. Squamous cell carcinoma of the thyroid: outcome of treatment in 16 patients. *European journal of surgical oncology : the journal of the European Society of Surgical Oncology and the British Association of Surgical Oncology*. 1999;25:606-609.
- Yu J, Ren P, Zhong T, et al. Pseudolaric acid B inhibits proliferation in SW579 human thyroid squamous cell carcinoma. *Molecular medicine reports*. 2015;12:7195-7202.
- Papotti M, Negro F, Carney JA, Bussolati G, Lloyd RV. Mixed medullary-follicular carcinoma of the thyroid. A morphological, immunohistochemical and in situ hybridization analysis of 11 cases. *Virchows Archiv : an international journal of pathology*. 1997;430:397-405.
- Kostoglou-Athanassiou I, Athanassiou P, Vecchini G, Gogou L, Kaldrymides P. Mixed medullary-follicular thyroid carcinoma. Report of a case and review of the literature. *Hormone research*. 2004;61:300-304.
- Kim WG, Gong G, Kim EY, et al. Concurrent occurrence of medullary thyroid carcinoma and papillary thyroid carcinoma in the same thyroid should be considered as coincidental. *Clinical endocrinology*. 2010;72:256-263.
- Ueki I, Ando T, Haraguchi A, et al. A case of mixed medullary and follicular cell carcinoma of the thyroid. *Internal medicine*. 2011;50:1313-1316.
- Tohidi M, Pourbehi G, Bahmanyar M, Eghbali SS, Kalantar Hormozi M, Nabipour I. Mixed medullary-follicular carcinoma of the thyroid. *Case reports in endocrinology*. 2013;2013:571692.
- Apel RL, Alpert LC, Rizzo A, LiVolsi VA, Asa SL. A metastasizing composite carcinoma of the thyroid with distinct medullary and papillary components. *Archives of pathology & laboratory medicine*. 1994;118:1143-1147.
- Ljungberg O, Ericsson UB, Bondesson L, Thorell J. A compound follicular-parafollicular cell carcinoma of the thyroid: a new tumor entity? *Cancer*. 1983;52:1053-1061.
- Zhang P, Zuo H, Ozaki T, Nakago-

- mi N, Kakudo K. Cancer stem cell hypothesis in thyroid cancer. *Pathology international*. 2006;56:485-489.
31. Sadow PM, Hunt JL. Mixed Medullary-follicular-derived carcinomas of the thyroid gland. *Advances in anatomic pathology*. 2010;17:282-285.
 32. Volante M, Papotti M, Roth J, et al. Mixed medullary-follicular thyroid carcinoma. Molecular evidence for a dual origin of tumor components. *The American journal of pathology*. 1999;155:1499-1509.
 33. Luboshitzky R, Dharan M. Mixed follicular-medullary thyroid carcinoma: a case report. *Diagnostic cytopathology*. 2004;30:122-124.
 34. Liu Y, Yuan L, Yang D, Jin Y. Serum calcitonin negative mixed medullary-follicular carcinoma initially diagnosed as medullary thyroid carcinoma by fine-needle aspiration cytology: A case report and review of the literatures. *Diagnostic cytopathology*. 2018;46:690-693.
 35. Bhatnagar P, Bhatnagar A, Kishan S, et al. Unusual widespread metastatic presentation of mixed medullary-follicular thyroid carcinoma. *Clinical nuclear medicine*. 2004;29:303-305.
 36. Hales M, Rosenau W, Okerlund MD, Galante M. Carcinoma of the thyroid with a mixed medullary and follicular pattern: morphologic, immunohistochemical, and clinical laboratory studies. *Cancer*. 1982;50:1352-1359.
 37. Le QV, Ngo DQ, Ngo QX. Primary Mucoepidermoid Carcinoma of the Thyroid: A Report of a Rare Case with Bone Metastasis and Review of the Literature. *Case reports in oncology*. 2019;12:248-259.
 38. Wenig BM, Adair CF, Heffess CS. Primary mucoepidermoid carcinoma of the thyroid gland: a report of six cases and a review of the literature of a follicular epithelial-derived tumor. *Human pathology*. 1995;26:1099-1108.
 39. Minagawa A, Iitaka M, Suzuki M, et al. A case of primary mucoepidermoid carcinoma of the thyroid: molecular evidence of its origin. *Clinical endocrinology*. 2002;57:551-556.
 40. Baloch ZW, Solomon AC, LiVol-si VA. Primary mucoepidermoid carcinoma and sclerosing mucoepidermoid carcinoma with eosinophilia of the thyroid gland: a report of nine cases. *Modern pathology : an official journal of the United States and Canadian Academy of Pathology, Inc*. 2000;13:802-807.
 41. Fulciniti F, Vuttariello E, Calise C, et al. Combined papillary and mucoepidermoid carcinoma of the thyroid gland: a possible collision tumor diagnosed on fine-needle cytology. Report of a case with immunocytochemical and molecular correlations. *Endocrine pathology*. 2015;26:140-144.
 42. Taconet S, Bosq J, Hartl D, et al. Composite Mucoepidermoid Carcinoma and Columnar Cell Variant of Papillary Carcinoma of the Thyroid: A Case Report and Review of the Literature. *International journal of surgical pathology*. 2016;24:336-340.
 43. Prichard RS, Lee JC, Gill AJ, et al. Mucoepidermoid carcinoma of the thyroid: a report of three cases and postulated histogenesis. *Thyroid : official journal of the American Thyroid Association*. 2012;22:205-209.
 44. Shindo K, Aishima S, Okido M, Ohshima A. A poor prognostic case of mucoepidermoid carcinoma of the thyroid: a case report. *Case reports in endocrinology*. 2012;2012:862545.
 45. Rhatigan RM, Roque JL, Bucher RL. Mucoepidermoid carcinoma of the thyroid gland. *Cancer*. 1977;39:210-214.
 46. Bhandarkar ND, Chan J, Strome M. A rare case of mucoepidermoid carcinoma of the thyroid. *American journal of otolaryngology*. 2005;26:138-141.
 47. Farhat NA, Faquin WC, Sadow PM. Primary mucoepidermoid carcinoma of the thyroid gland: a report of three cases and review of the literature. *Endocrine pathology*. 2013;24:229-233.
 48. Franssila KO, Harach HR, Wase-nius VM. Mucoepidermoid carcinoma of the thyroid. *Histopathology*. 1984;8:847-860.
 49. Ando M, Nakanishi Y, Asai M, Maeshima A, Matsuno Y. Mu-coepidermoid carcinoma of the thyroid gland showing marked ciliation suggestive of its pathogenesis. *Pathology international*. 2008;58:741-744.
 50. Jayakody NS, Faoury M, Fraser LR, Jogai S, Patel NN. Composite poorly differentiated mucoepidermoid carcinoma of the thyroid and follicular variant of papillary thyroid carcinoma. Report of a case and review of the literature. *Journal of surgical case reports*. 2019;2019:rjz092.
 51. Boccon-Gibod L, Boman F, Josset P, Landman-Parker J. Mucoepidermoid carcinoma of the parotid gland in a child previously treated for acute lymphoblastic leukemia. *Pediatric blood & cancer*. 2005;44:673-675.
 52. Bondeson L, Bondeson AG, Thompson NW. Papillary carcinoma of the thyroid with mucoepidermoid features. *American journal of clinical pathology*. 1991;95:175-179.
 53. Rocha AS, Soares P, Machado JC, et al. Mucoepidermoid carcinoma of the thyroid: a tumour histotype characterised by P-cadherin neoexpression and marked abnormalities of E-cadherin/catenins complex. *Virchows Archiv : an international journal of pathology*. 2002;440:498-504.
 54. Harach HR, Vujanic GM, Jasani B. Ultimobranchial body nests in human fetal thyroid: an autopsy, histological, and immunohistochemical study in relation to solid cell nests and mucoepidermoid carcinoma of the thyroid. *The Journal of pathology*. 1993;169:465-469.
 55. Tanda F, Massareui G, Bosincu L. Primary mucoepidermoid carcinoma of the thyroid. *Surg Pathol*. 2000;3:317-24.
 56. Cameselle-Teijeiro J, Febles-Perez C, Sobrinho-Simoes M. Papillary and mucoepidermoid carcinoma of the thyroid with anaplastic transformation: a case report with histologic and immunohistochemical findings that support a provocative histogenetic hypothesis. *Pathology, research and practice*. 1995;191:1214-1221.
 57. Chan JK, Albores-Saavedra J, Battifora H, Carcangiu ML, Rosai J. Sclerosing mucoepidermoid thy-

- roid carcinoma with eosinophilia. A distinctive low-grade malignancy arising from the metaplastic follicles of Hashimoto's thyroiditis. *The American journal of surgical pathology*. 1991;15:438-448.
58. Shah AA, La Fortune K, Miller C, et al. Thyroid sclerosing mucoepidermoid carcinoma with eosinophilia: a clinicopathologic and molecular analysis of a distinct entity. *Modern pathology : an official journal of the United States and Canadian Academy of Pathology, Inc*. 2017;30:329-339.
 59. Pantola C, Kala S, Athar M, Thakur S. Sclerosing mucoepidermoid carcinoma with eosinophilia of the thyroid: A cytological dilemma. *Journal of cytology*. 2016;33:37-39.
 60. Wiles AB, Kraft AO, Mueller SM, Powers CN. Sclerosing mucoepidermoid carcinoma with eosinophilia of the thyroid: Case report of a rare lesion with novel genetic mutation. *Diagnostic cytopathology*. 2019;47:589-593.
 61. Geisinger KR, Steffee CH, McGee RS, Woodruff RD, Buss DH. The cytomorphic features of sclerosing mucoepidermoid carcinoma of the thyroid gland with eosinophilia. *American journal of clinical pathology*. 1998;109:294-301.
 62. Hirokawa M, Takada N, Abe H, et al. Thyroid sclerosing mucoepidermoid carcinoma with eosinophilia distinct from the salivary type. *Endocrine journal*. 2018;65:427-436.
 63. Quiroga-Garza G, Lee JH, El-Naggar A, et al. Sclerosing mucoepidermoid carcinoma with eosinophilia of the thyroid: more aggressive than previously reported. *Human pathology*. 2015;46:725-731.
 64. Nayak SK, Pai PK, Naik R, Rao VS. Extensive squamous metaplasia in nodular goiter--a diagnostic dilemma in the fine needle aspiration (FNA) cytology--a case report. *Indian journal of pathology & microbiology*. 2002;45:111-113.
 65. Lai CY, Chao TC, Lin JD, Hsueh C. Sclerosing mucoepidermoid carcinoma with eosinophilia of thyroid gland in a male patient: a case report and literature review. *International journal of clinical and experimental pathology*. 2015;8:5947-5951.
 66. Solomon AC, Baloch ZW, Salhany KE, Mandel S, Weber RS, LiVolsi VA. Thyroid sclerosing mucoepidermoid carcinoma with eosinophilia: mimic of Hodgkin disease in nodal metastases. *Archives of pathology & laboratory medicine*. 2000;124:446-449.
 67. Sim SJ, Ro JY, Ordóñez NG, Cleary KR, Ayala AG. Sclerosing mucoepidermoid carcinoma with eosinophilia of the thyroid: report of two patients, one with distant metastasis, and review of the literature. *Human pathology*. 1997;28:1091-1096.
 68. Matsuo M, Tuneyoshi M, Mine M. Primary mucinous carcinoma with rhabdoid cells of the thyroid gland: a case report. *Diagnostic pathology*. 2016;11:48.
 69. Diaz-Perez R, Quiroz H, Nishiyama RH. Primary mucinous adenocarcinoma of thyroid gland. *Cancer*. 1976;38:1323-1325.
 70. Kondo T, Kato K, Nakazawa T, Miyata K, Murata S, Katoh R. Mucinous carcinoma (poorly differentiated carcinoma with extensive extracellular mucin deposition) of the thyroid: a case report with immunohistochemical studies. *Human pathology*. 2005;36:698-701.
 71. Sobrinho-Simoes M, Stenwig AE, Nesland JM, Holm R, Johannessen JV. A mucinous carcinoma of the thyroid. *Pathology, research and practice*. 1986;181:464-471.
 72. Mnif H, Chakroun A, Charfi S, El-louze S, Ghorbel M, Sallemi-Boudawara T. Primary mucinous carcinoma of the thyroid gland: case report with review of the literature. *Pathologica*. 2013;105:128-131.
 73. Cruz MC, Marques LP, Sambade C, Sobrinho-Simoes MA. Primary mucinous carcinoma of the thyroid. *Surg Pathol*. 1991;4:266-73.
 74. D'Antonio A, Adesso M, De Dominicis G, Boscaino A, Liguori G, Nappi O. Mucinous carcinoma of thyroid gland. Report of a primary and a metastatic mucinous tumour from ovarian adenocarcinoma with immunohistochemical study and review of literature. *Virchows Archiv : an international journal of pathology*. 2007;451:847-851.
 75. Wang J, Guli QR, Ming XC, et al. Primary mucinous carcinoma of thyroid gland with prominent signet-ring-cell differentiation: a case report and review of the literature. *OncoTargets and therapy*. 2018;11:1521-1528.
 76. Bajja MY, Benassila FZ, Abada RL, Mahtar M, Chadli A. Mucinous carcinoma of the thyroid: A case report and review of the literature. *Annales d'endocrinologie*. 2017;78:70-73.
 77. Minniti S, Valentini M, Pinali L, Malago R, Lestani M, Procacci C. Thymic masses of the middle mediastinum: report of 2 cases and review of the literature. *Journal of thoracic imaging*. 2004;19:192-195.
 78. Hino H, Nitadori JI, Ohno K, et al. An Unusual Invasive Ectopic Thymoma in the Thyroid and Anterior Mediastinum. *The Annals of thoracic surgery*. 2018;106:e65-e67.
 79. Chan JK, Rosai J. Tumors of the neck showing thymic or related branchial pouch differentiation: a unifying concept. *Human pathology*. 1991;22:349-367.
 80. Weissferdt A, Moran CA. Ectopic primary intrathyroidal thymoma: a clinicopathological and immunohistochemical analysis of 3 cases. *Human pathology*. 2016;49:71-76.
 81. Cohen JB, Troxell M, Kong CS, McDougall IR. Ectopic intrathyroidal thymoma: a case report and review. *Thyroid : official journal of the American Thyroid Association*. 2003;13:305-308.
 82. Asa SL, Dardick I, Van Nostrand AW, Bailey DJ, Gullane PJ. Primary thyroid thymoma: a distinct clinicopathologic entity. *Human pathology*. 1988;19:1463-1467.
 83. Lewis JE, Wick MR, Scheithauer BW, Bernatz PE, Taylor WF. Thymoma. A clinicopathologic review. *Cancer*. 1987;60:2727-2743.
 84. Fukushima T, Suzuki S, Ohira T, et al. Prevalence of ectopic intrathyroidal thymus in Japan: the Fukushima health management survey. *Thyroid : official journal of the American Thyroid Association*. 2015;25:534-537.
 85. Harach HR, Vujanic GM. Intrathyroidal thymic tissue: an autopsy

- study in fetuses with some emphasis on pathological implications. *Pediatric pathology*. 1993;13:431-434.
86. Apel RL, Asa SL, Chalvardjian A, LiVolsi VA. Intrathyroidal lymphoepithelial cysts of probable branchial origin. *Human pathology*. 1994;25:1238-1242.
 87. Kakudo K, Chan JKC, Cheuk W, Dorfman DM, Giordano TJ, et al. (2017) Intrathyroid thymic carcinoma. In: Lloyd RV, Osamura RY, Klöppel G, Rosai J (eds) World Health Organization Classification of Tumours of Endocrine Organs (4th). IARC, Lyon: 125–126.
 88. Ge W, Yao YZ, Chen G, Ding YT. Clinical analysis of 82 cases of carcinoma showing thymus-like differentiation of the thyroid. *Oncology letters*. 2016;11:1321-1326.
 89. Reimann JD, Dorfman DM, Nose V. Carcinoma showing thymus-like differentiation of the thyroid (CASTLE): a comparative study: evidence of thymic differentiation and solid cell nest origin. *The American journal of surgical pathology*. 2006;30:994-1001.
 90. Ito Y, Miyauchi A, Nakamura Y, Miya A, Kobayashi K, Kakudo K. Clinicopathologic significance of intrathyroidal epithelial thymoma/carcinoma showing thymus-like differentiation: a collaborative study with Member Institutes of The Japanese Society of Thyroid Surgery. *American journal of clinical pathology*. 2007;127:230-236.
 91. Wu MH, Wu HY. Thyroid carcinoma showing thymus-like differentiation with tracheal invasion. *Asian cardiovascular & thoracic annals*. 2016;24:878-880.
 92. Chung SM, Kim KJ, Moon JS, Hong YH, Kang SH. Fever of unknown origin caused by intrathyroidal thymic carcinoma. *The Korean journal of internal medicine*. 2019;34:683-684.
 93. Liu Z, Teng XY, Sun DX, Xu WX, Sun SL. Clinical analysis of thyroid carcinoma showing thymus-like differentiation: report of 8 cases. *International surgery*. 2013;98:95-100.
 94. Collins JA, Ping B, Bishop JA, Ali SZ. Carcinoma Showing Thymus-Like Differentiation (CASTLE): Cytopathological Features and Differential Diagnosis. *Acta cytologica*. 2016;60:421-428.
 95. Dorfman DM, Shahsafaei A, Miyauchi A. Intrathyroidal epithelial thymoma (ITET)/carcinoma showing thymus-like differentiation (CASTLE) exhibits CD5 immunoreactivity: new evidence for thymic differentiation. *Histopathology*. 1998;32:104-109.
 96. Weissferdt A, Moran CA. Immunohistochemistry in the diagnosis of thymic epithelial neoplasms. *Applied immunohistochemistry & molecular morphology : AIMM*. 2014;22:479-487.
 97. Kong F, Ying H, Zhai R, et al. Clinical outcome of intensity modulated radiotherapy for carcinoma showing thymus-like differentiation. *Oncotarget*. 2016;7:81899-81905.
 98. Hirokawa M, Miyauchi A, Minato H, Yokoyama S, Kuma S, Kojima M. Intrathyroidal epithelial thymoma/carcinoma showing thymus-like differentiation; comparison with thymic lymphoepithelioma-like carcinoma and a possibility of development from a multipotential stem cell. *APMIS : acta pathologica, microbiologica, et immunologica Scandinavica*. 2013;121:523-530.
 99. Suzuki A, Hirokawa M, Takada N, et al. Utility of monoclonal PAX8 antibody for distinguishing intrathyroid thymic carcinoma from follicular cell-derived thyroid carcinoma. *Endocrine journal*. 2018;65:1171-1175.
 100. Dong W, Zhang P, Li J, et al. Outcome of Thyroid Carcinoma Showing Thymus-Like Differentiation in Patients Undergoing Radical Resection. *World journal of surgery*. 2018;42:1754-1761.
 101. Tsutsui H, Hoshi M, Kubota M, et al. Management of thyroid carcinoma showing thymus-like differentiation (CASTLE) invading the trachea. *Surgery today*. 2013;43:1261-1268.
 102. Chow SM, Chan JK, Tse LL, Tang DL, Ho CM, Law SC. Carcinoma showing thymus-like element (CASTLE) of thyroid: combined modality treatment in 3 patients with locally advanced disease. *European journal of surgical oncology : the journal of the European Society of Surgical Oncology and the British Association of Surgical Oncology*. 2007;33:83-85.
 103. Hanamura T, Ito K, Uehara T, Fukushima T, Sasaki S, Koizumi T. Chemosensitivity in Carcinoma Showing Thymus-Like Differentiation: A Case Report and Review of the Literature. *Thyroid : official journal of the American Thyroid Association*. 2015;25:969-972.
 104. Ippolito S, Bellevisine C, Arpaia D, et al. Spindle epithelial tumor with thymus-like differentiation (SETTLE): clinical-pathological features, differential pathological diagnosis and therapy. *Endocrine*. 2016;51:402-412.
 105. Recondo G, Jr., Busaidy N, Erasmus J, Williams MD, Johnson FM. Spindle epithelial tumor with thymus-like differentiation: A case report and comprehensive review of the literature and treatment options. *Head & neck*. 2015;37:746-754.
 106. Raffel A, Cupisti K, Rees M, et al. Spindle epithelial tumour with thymus-like differentiation (SETTLE) of the thyroid gland with widespread metastases in a 13-year-old girl. *Clinical oncology*. 2003;15:490-495.
 107. Kloboves-Prevodnik V, Jazbec J, Us-Krasovec M, Lamovec J. Thyroid spindle epithelial tumor with thymus-like differentiation (SETTLE): is cytopathological diagnosis possible? *Diagnostic cytopathology*. 2002;26:314-319.
 108. Nambirajan A, Singh V, Irugu DVK, Agarwal S, Jain D. Spindle epithelial tumor with thymus-like differentiation of thyroid presenting with lymph node metastasis: An illustrative case report with review of literature. *Cytopathology : official journal of the British Society for Clinical Cytology*. 2019.
 109. Baste Subia MN, Digoy P, Hum M, Yu Z, Conrad R. Cytologic findings of spindle epithelial tumor with thymus-like elements. *The Laryngoscope*. 2018;128:E78-E82.
 110. Abrosimov AY, LiVolsi VA. Spindle epithelial tumor with thymus-like differentiation (SETTLE) of the thyroid with neck lymph node metastasis: a case report. *Endocrine pathology*. 2005;16:139-143.
 111. Misra RK, Mitra S, Yadav R, Bun-

- dela A. Spindle epithelial tumor with thymus-like differentiation: a case report and review of literature. *Acta cytologica*. 2013;57:303-308.
112. Erickson ML, Tapia B, Moreno ER, McKee MA, Kowalski DP, Reyes-Mugica M. Early metastasizing spindle epithelial tumor with thymus-like differentiation (SETTLE) of the thyroid. *Pediatric and developmental pathology : the official journal of the Society for Pediatric Pathology and the Paediatric Pathology Society*. 2005;8:599-606.
 113. Cheuk W, Jacobson AA, Chan JK. Spindle epithelial tumor with thymus-like differentiation (SETTLE): a distinctive malignant thyroid neoplasm with significant metastatic potential. *Modern pathology : an official journal of the United States and Canadian Academy of Pathology, Inc*. 2000;13:1150-1155.
 114. Sykes JM, Ossoff RH. Paragangliomas of the head and neck. *Otolaryngologic clinics of North America*. 1986;19:755-767.
 115. von Dobschuetz E, Leijon H, Schalin-Jantti C, et al. A registry-based study of thyroid paraganglioma: histological and genetic characteristics. *Endocrine-related cancer*. 2015;22:191-204.
 116. Pelizzo MR, Conti C, Pennelli G, et al. Thyroid Paraganglioma: Our Experience and Systematic Review of the Literature on a Rare Tumor. *American journal of clinical oncology*. 2018;41:416-423.
 117. D'Angelo FA, Antolino L, Magistri P, et al. Primary thyroid paraganglioma: a rare entity affecting middle-aged women. *The American surgeon*. 2013;79:E351-353.
 118. Phitayakorn R, Faquin W, Wei N, Barbesino G, Stephen AE. Thyroid-associated paragangliomas. *Thyroid : official journal of the American Thyroid Association*. 2011;21:725-733.
 119. Tischler AS, Pacak K, Eisenhofer G. The adrenal medulla and extra-adrenal paraganglia: then and now. *Endocrine pathology*. 2014;25:49-58.
 120. Pellitteri PK, Rinaldo A, Myssiorek D, et al. Paragangliomas of the head and neck. *Oral oncology*. 2004;40:563-575.
 121. Hodge KM, Byers RM, Peters LJ. Paragangliomas of the head and neck. *Archives of otolaryngology--head & neck surgery*. 1988;114:872-877.
 122. Armstrong MJ, Chiosea SI, Carty SE, Hodak SP, Yip L. Thyroid paragangliomas are locally aggressive. *Thyroid : official journal of the American Thyroid Association*. 2012;22:88-93.
 123. Sangtian J, Evasovich MR, Harindhanavudhi T. A Rarity in a Common Disease: Thyroid Paraganglioma. *The American journal of medicine*. 2017;130:e133-e135.
 124. King KS, Chen CC, Alexopoulos DK, et al. Functional imaging of SDHx-related head and neck paragangliomas: comparison of 18F-fluorodihydroxyphenylalanine, 18F-fluorodopamine, 18F-fluoro-2-deoxy-D-glucose PET, 123I-metaiodobenzylguanidine scintigraphy, and 111In-pentetreotide scintigraphy. *The Journal of clinical endocrinology and metabolism*. 2011;96:2779-2785.
 125. Zhang W, Policarpio-Nicolas ML. Aspiration cytology of primary thyroid paraganglioma. *Diagnostic cytopathology*. 2015;43:838-843.
 126. Sanchez AM. Malignant paraganglioma of the thyroid gland with lymph node metastasis in a 68-year-old woman. *Arch Pathol Lab Med* 2013;137(10):1523.
 127. Cetin S, Kir G, Yilmaz M. Thyroid Paraganglioma Diagnosed by Fine-Needle Aspiration Biopsy, Correlated With Histopathological Findings: Report of a Case. *Diagnostic cytopathology*. 2016;44:643-647.
 128. Lee SM, Policarpio-Nicolas ML. Thyroid Paraganglioma. *Archives of pathology & laboratory medicine*. 2015;139:1062-1067.
 129. Aydogan BI, Dizbay Sak S, Gullu S. Cervical Paraganglioma Mimicking Thyroid Nodule: A Rare Clinical Case. *Case reports in endocrinology*. 2016;2016:8527279.
 130. Mohyuddin N, Ferrer K, Patel U. Malignant paraganglioma of the thyroid gland with synchronous bilateral carotid body tumors. *Ear, nose, & throat journal*. 2013;92:E20-23.
 131. Calo PG, Lai ML, Guitoli E, et al. Difficulties in the diagnosis of thyroid paraganglioma: a clinical case. *La Clinica terapeutica*. 2013;164:e35-39.
 132. Martin CE, Rosenfeld L, McSwain B. Carotid body tumors: a 16-year follow-up of seven malignant cases. *Southern medical journal*. 1973;66:1236-1243.
 133. Sanz-Santos J, Cirauqui B, Sanchez E, et al. Endobronchial ultrasound-guided transbronchial needle aspiration in the diagnosis of intrathoracic lymph node metastases from extrathoracic malignancies. *Clinical & experimental metastasis*. 2013;30:521-528.
 134. Vazquez-Benitez G, Perez-Campos A, Masgrau NA, Perez-Barríos A. Unexpected Tumor: Primary Asymptomatic Schwannoma in Thyroid Gland. *Endocrine pathology*. 2016;27:46-49.
 135. Aron M, Kapila K, Verma K. Neural tumours of the neck presenting as thyroid nodules: a report of three cases. *Cytopathology : official journal of the British Society for Clinical Cytology*. 2005;16:206-209.
 136. Altuna X, Lopez JP, Yu MA, et al. Potential role of imatinib mesylate (Gleevec, STI-571) in the treatment of vestibular schwannoma. *Otology & neurotology : official publication of the American Otological Society, American Neurotology Society [and] European Academy of Otology and Neurotology*. 2011;32:163-170.
 137. De Simone B, Del Rio P, Sianesi M. Schwannoma mimicking a neoplastic thyroid nodule. *Updates in surgery*. 2014;66:85-87.
 138. Kim DH, Murovic JA, Tiel RL, Moes G, Kline DG. A series of 397 peripheral neural sheath tumors: 30-year experience at Louisiana State University Health Sciences Center. *Journal of neurosurgery*. 2005;102:246-255.
 139. Perrin RG, Guha A. Malignant peripheral nerve sheath tumors. *Neurosurgery clinics of North America*. 2004;15:203-216.
 140. Pallares J, Perez-Ruiz L, Ros S, et al. Malignant peripheral nerve sheath tumor of the thyroid: a clinicopathological and ultrastructural study of one case. *Endocrine pathology*. 2004;15:167-174.

141. Gampfer TJ, Morgan RF. Vascular anomalies: hemangiomas. *Plastic and reconstructive surgery*. 2002;110:572-585; quiz 586; discussion 587-578.
142. Kano M, Kameyama K, Hosoda Y, Sugino K, Ito K. A cavernous hemangioma of the thyroid gland. *The Journal of laryngology and otology*. 2005;119:828-830.
143. Kumar R, Gupta R, Khullar S, Dasan B, Malhotra A. Thyroid hemangioma: a case report with a review of the literature. *Clinical nuclear medicine*. 2000;25:769-771.
144. Miao J, Chen S, Li Y, Fu L, Li H. A primary cavernous hemangioma of the thyroid gland: A case report and literature review. *Medicine*. 2017;96:e8651.
145. Tsang K, Duggan MA. Vascular proliferation of the thyroid. A complication of fine-needle aspiration. *Archives of pathology & laboratory medicine*. 1992;116:1040-1042.
146. Gutzeit A, Stuckmann G, Tosoni I, Erdin D, Binkert CA. A cavernous hemangioma of the thyroid gland: First documentation by ultrasound of a rare pathology. *Journal of clinical ultrasound : JCU*. 2011;39:172-174.
147. Emery PJ, Bailey CM, Evans JN. Cystic hygroma of the head and neck. A review of 37 cases. *The Journal of laryngology and otology*. 1984;98:613-619.
148. Gardner DF, Frable WJ. Primary lymphangioma of the thyroid gland. *Archives of pathology & laboratory medicine*. 1989;113:1084-1085.
149. Shlizerman L, Mazzawi S, Elmalah I. Lymphangioma of the thyroid. *The Israel Medical Association journal : IMAJ*. 2008;10:162-163.
150. Celasun B, Aksu A, Ozguven MA, Gunhan O, Finci R. Lymphangioma-like change of the thyroid. *Histopathology*. 1992;21:485-486.
151. Schallock G, Ganz H. [A case of lymphangiomatosis of the thyroid gland]. *Zentralblatt fur allgemeine Pathologie u pathologische Anatomie*. 1958;98:188-194.
152. Lee SW, Shin EA, Kwon KW, Hong HS, Koh YW. Primary lymphangioma of the thyroid gland. *Thyroid : official journal of the American Thyroid Association*. 2009;19:915-916.
153. Hart J, Mandavilli S. Epithelioid angiosarcoma: a brief diagnostic review and differential diagnosis. *Archives of pathology & laboratory medicine*. 2011;135:268-272.
154. Collini P, Barisella M, Renne SL, et al. Epithelioid angiosarcoma of the thyroid gland without distant metastases at diagnosis: report of six cases with a long follow-up. *Virchows Archiv : an international journal of pathology*. 2016;469:223-232.
155. Hedinger C. Geographic pathology of thyroid diseases. *Pathology, research and practice*. 1981;171:285-292.
156. Marina M, Corcione L, Serra MF, Ferri T, Silini EM, Ceresini G. Primary Epithelioid Angiosarcoma of the Thyroid in a Patient Occupationally Exposed to Radiations. *Frontiers in endocrinology*. 2018;9:577.
157. Prather J, Mehrotra S. Thyroid nodule. Primary thyroid angiosarcoma. *JAMA otolaryngology-- head & neck surgery*. 2014;140:469-470.
158. Del Rio P, Cataldo S, Sommaruga L, Corcione L, Guazzi A, Sianesi M. A rare case of thyroid haemangiosarcoma. *Chirurgia italiana*. 2007;59:747-749.
159. Kefeli M, Mete O. An unusual malignant thyroid nodule: coexistence of epithelioid angiosarcoma and follicular variant papillary thyroid carcinoma. *Endocrine pathology*. 2014;25:350-352.
160. Nechifor-Boila A, Decaussin-Petrucci M, Varga-Ilyes A, Chinezu L, Carasca C, Borda A. Angioinvasion as a factor for predicting aggressive outcome in primary thyroid angiosarcoma: three case reports and literature review. *Polish journal of pathology : official journal of the Polish Society of Pathologists*. 2018;69:53-61.
161. De Felice F, Moscatelli E, Orelli S, Bulzonetti N, Musio D, Tombolini V. Primary thyroid angiosarcoma: A systematic review. *Oral oncology*. 2018;82:48-52.
162. Kaur A, Didolkar MS, Thomas A. Angiosarcoma of the thyroid: a case report with review of the literature. *Endocrine pathology*. 2013;24:156-161.
163. Park MS, Ravi V, Araujo DM. Inhibiting the VEGF-VEGFR pathway in angiosarcoma, epithelioid hemangioendothelioma, and hemangiopericytoma/solitary fibrous tumor. *Current opinion in oncology*. 2010;22:351-355.
164. Biankin SA, Cachia AR. Leiomyoma of the thyroid gland. *Pathology*. 1999;31:64-66.
165. Thompson LD, Wenig BM, Adair CF, Shmookler BM, Heffess CS. Primary smooth muscle tumors of the thyroid gland. *Cancer*. 1997;79:579-587.
166. Andrion A, Bellis D, Delsedime L, Bussolati G, Mazzucco G. Leiomyoma and neurilemoma: report of two unusual non-epithelial tumours of the thyroid gland. *Virchows Archiv A, Pathological anatomy and histopathology*. 1988;413:367-372.
167. Hendrick JW. Leiomyoma of thyroid gland; report of case. *Surgery*. 1957;42:597-599.
168. Zhang Y, Tang H, Hu H, Yong X. A Rare Primary Tumor of the Thyroid Gland: A New Case of Leiomyoma and Literature Review. *Clinical Medicine Insights Oncology*. 2018;12:1179554918813535.
169. Mohammed AZ, Edino ST, Umar AB. Leiomyoma of the thyroid gland with psammoma bodies. *Nigerian medical journal : journal of the Nigeria Medical Association*. 2015;56:71-73.
170. Erkilic S, Erkilic A, Bayazit YA. Primary leiomyoma of the thyroid gland. *The Journal of laryngology and otology*. 2003;117:832-834.
171. Akcam T, Oysul K, Birkent H, Gerek M, Yetiser S. Leiomyosarcoma of the head and neck: report of two cases and review of the literature. *Auris, nasus, larynx*. 2005;32:209-212.
172. Sahin MI, Vural A, Yuce I, Cagli S, Deniz K, Guney E. Thyroid leiomyosarcoma: presentation of two cases and review of the literature. *Brazilian journal of otorhinolaryngology*. 2016;82:715-721.
173. Chetty R, Clark SP, Dowling JP. Leiomyosarcoma of the thyroid: immunohistochemical and ultrastructural study. *Pathology*. 1993;25:203-205.
174. Zou ZY, Ning N, Li SY, Li J, Du XH, Li R. Primary thyroid leiomyosarcoma: A case report and

- literature review. *Oncology letters*. 2016;11:3982-3986.
175. Wang TS, Ocal IT, Oxley K, Sosa JA. Primary leiomyosarcoma of the thyroid gland. *Thyroid : official journal of the American Thyroid Association*. 2008;18:425-428.
 176. Tulbah A, Al-Dayel F, Fawaz I, Rosai J. Epstein-Barr virus-associated leiomyosarcoma of the thyroid in a child with congenital immunodeficiency: a case report. *The American journal of surgical pathology*. 1999;23:473-476.
 177. Takayama F, Takashima S, Matsuba H, Kobayashi S, Ito N, Sone S. MR imaging of primary leiomyosarcoma of the thyroid gland. *European journal of radiology*. 2001;37:36-41.
 178. Day AS, Lou PJ, Lin WC, Chou CC. Over-expression of c-kit in a primary leiomyosarcoma of the thyroid gland. *European archives of oto-rhino-laryngology : official journal of the European Federation of Oto-Rhino-Laryngological Societies*. 2007;264:705-708.
 179. Kushnir I, Soyfer V, Merimsky O. A Case Report of Metastatic Primary Thyroid Leiomyosarcoma Treated with Pazopanib. *The Israel Medical Association journal : IMAJ*. 2018;20:125-126.
 180. Thompson LDR, Wei C, Rooper LM, Lau SK. Thyroid Gland Solitary Fibrous Tumor: Report of 3 Cases and a Comprehensive Review of the Literature. *Head and neck pathology*. 2019.
 181. Robinson DR, Wu YM, Kalyana-Sundaram S, et al. Identification of recurrent NAB2-STAT6 gene fusions in solitary fibrous tumor by integrative sequencing. *Nature genetics*. 2013;45:180-185.
 182. Filho GB, Toppa NH, Miranda D, Matos MP, da Silva AL. Giant solitary trichoepithelioma. *Archives of dermatology*. 1984;120:797-798.
 183. Mizuuchi Y, Yamamoto H, Nakamura K, et al. Solitary fibrous tumor of the thyroid gland. *Medical molecular morphology*. 2014;47:117-122.
 184. Zheng BH, Liu LZ, Zhang ZZ, et al. Radiomics score: a potential prognostic imaging feature for postoperative survival of solitary HCC patients. *BMC cancer*. 2018;18:1148.
 185. Ghasemi-Rad M, Wang KY, Jain S, Lincoln CM. Solitary fibrous tumor of thyroid: a case report with review of literature. *Clinical imaging*. 2019;53:105-107.
 186. Doyle LA, Vivero M, Fletcher CD, Mertens F, Hornick JL. Nuclear expression of STAT6 distinguishes solitary fibrous tumor from histologic mimics. *Modern pathology : an official journal of the United States and Canadian Academy of Pathology, Inc*. 2014;27:390-395.
 187. Gholami S, Cassidy MR, Kirane A, et al. Size and Location are the Most Important Risk Factors for Malignant Behavior in Resected Solitary Fibrous Tumors. *Annals of surgical oncology*. 2017;24:3865-3871.
 188. Ning S, Song X, Xiang L, Chen Y, Cheng Y, Chen H. Malignant solitary fibrous tumor of the thyroid gland: report of a case and review of the literature. *Diagnostic cytopathology*. 2011;39:694-699.
 189. Donadieu J, Rolon MA, Thomas C, et al. Endocrine involvement in pediatric-onset Langerhans' cell histiocytosis: a population-based study. *The Journal of pediatrics*. 2004;144:344-350.
 190. Ceyran AB, Senol S, Bayraktar B, Ozkanli S, Cinel ZL, Aydin A. Langerhans cell histiocytosis of the thyroid with multiple cervical lymph node involvement accompanying metastatic thyroid papillary carcinoma. *Case reports in pathology*. 2014;2014:184237.
 191. Chakraborty R, Hampton OA, Shen X, et al. Mutually exclusive recurrent somatic mutations in MAP2K1 and BRAF support a central role for ERK activation in LCH pathogenesis. *Blood*. 2014;124:3007-3015.
 192. Wu X, Chen S, Zhang LY, Luo YP, Jiang Y, Feng RE. Langerhans cell histiocytosis of the thyroid complicated by papillary thyroid carcinoma: A case report and brief literature review. *Medicine*. 2017;96:e7954.
 193. Lassalle S, Hofman V, Santini J, Sadoul JL, Hofman P. Isolated Langerhans cell histiocytosis of the thyroid and Graves' disease: an unreported association. *Pathology*. 2008;40:525-527.
 194. Chrisoulidou A, Xirou P, Boudina M, Margaritidou E, Patakiouta F. Images in Endocrine Pathology: Isolated Langerhans Cell Histiocytosis of the Thyroid in a Patient with Autoimmune Thyroiditis and Hyperthyroidism. *Endocrine pathology*. 2015;26:276-278.
 195. Patten DK, Wani Z, Tolley N. Solitary langerhans histiocytosis of the thyroid gland: a case report and literature review. *Head and neck pathology*. 2012;6:279-289.
 196. Behrens RJ, Levi AW, Westra WH, Dutta D, Cooper DS. Langerhans cell histiocytosis of the thyroid: a report of two cases and review of the literature. *Thyroid : official journal of the American Thyroid Association*. 2001;11:697-705.
 197. Gallo O, Libonati GA, Gallina E, et al. Langerhans cells related to prognosis in patients with laryngeal carcinoma. *Archives of otolaryngology--head & neck surgery*. 1991;117:1007-1010.
 198. Chen ED, Cheng P, Cai YF, et al. Ultrasonographic features of Langerhans cell histiocytosis of the thyroid. *International journal of clinical and experimental pathology*. 2014;7:1229-1235.
 199. Bucau M, Dahan H, Meignin V, Toubert ME, Tazi A, Cochand-Priollet B. FNA cytology revealing Langerhans cell histiocytosis and papillary thyroid carcinoma. *Cytopathology : official journal of the British Society for Clinical Cytology*. 2015;26:130-132.
 200. Saqi A, Kuker AP, Ebner SA, et al. Langerhans Cell Histiocytosis: Diagnosis on Thyroid Aspirate and Review of the Literature. *Head and neck pathology*. 2015;9:496-502.
 201. Merad M, Ginhoux F, Collin M. Origin, homeostasis and function of Langerhans cells and other langerin-expressing dendritic cells. *Nature reviews Immunology*. 2008;8:935-947.
 202. Vilallonga R, Ciudin A, Fort JM, et al. Isolated langerhans cell histiocytosis of the thyroid in an adult female: one-year followup. *International journal of endocrinology*. 2011;2011:898302.
 203. Lee FY, Jan YJ, Chou G, Wang J, Wang CC. Thyroid involvement in Rosai-Dorfman disease. *Thyroid : official journal of the American Thyroid Association*. 2007;17:471-

- 476.
204. Foucar E, Rosai J, Dorfman R. Sinus histiocytosis with massive lymphadenopathy (Rosai-Dorfman disease): review of the entity. *Seminars in diagnostic pathology*. 1990;7:19-73.
 205. Chhabra S, Agarwal R, Garg S, Singh H, Singh S. Rosai-Dorfman disease: A case report with extranodal thyroid involvement. *Diagnostic cytopathology*. 2012;40:447-449.
 206. Mrad K, Charfi L, Dhoub R, et al. [Extra-nodal Rosai-Dorfman disease: a case report with thyroid involvement]. *Annales de pathologie*. 2004;24:446-449; quiz 393.
 207. Powell JG, Goellner JR, Nowak LE, McIver B. Rosai-Dorfman disease of the thyroid masquerading as anaplastic carcinoma. *Thyroid : official journal of the American Thyroid Association*. 2003;13:217-221.
 208. Tamouridis N, Deladetsima JK, Kastanias I, et al. Cold thyroid nodule as the sole manifestation of Rosai-Dorfman disease with mild lymphadenopathy, coexisting with chronic autoimmune thyroiditis. *Journal of endocrinological investigation*. 1999;22:866-870.
 209. Larkin DF, Dervan PA, Munnely J, Finucane J. Sinus histiocytosis with massive lymphadenopathy simulating subacute thyroiditis. *Human pathology*. 1986;17:321-324.
 210. Gianella P, Dulguerov N, Arnoux G, Pusztazeri M, Seebach JD. Thyroid Rosai-Dorfman disease with infiltration of IgG4-bearing plasma cells associated with multiple small pulmonary cysts. *BMC pulmonary medicine*. 2019;19:83.
 211. Vujhini SK, Kolte SS, Satarkar RN, Srikanth S. Fine needle aspiration diagnosis of Rosai-Dorfman Disease involving thyroid. *Journal of cytology*. 2012;29:83-85.
 212. Fonseca R, Yamakawa M, Nakamura S, et al. Follicular dendritic cell sarcoma and interdigitating reticulum cell sarcoma: a review. *American journal of hematology*. 1998;59:161-167.
 213. Pruneri G, Masullo M, Renne G, et al. Follicular dendritic cell sarcoma of the breast. *Virchows Archiv : an international journal of pathology*. 2002;441:194-199.
 214. Davila JI, Starr JS, Attia S, et al. Comprehensive Genomic Profiling of a Rare Thyroid Follicular Dendritic Cell Sarcoma. *Rare tumors*. 2017;9:6834.
 215. Starr JS, Attia S, Joseph RW, Menke D, Casler J, Smallridge RC. Follicular Dendritic Cell Sarcoma Presenting As a Thyroid Mass. *Journal of clinical oncology : official journal of the American Society of Clinical Oncology*. 2015;33:e74-76.
 216. Galati LT, Barnes EL, Myers EN. Dendritic cell sarcoma of the thyroid. *Head & neck*. 1999;21:273-275.
 217. Yu L, Yang SJ. Primary follicular dendritic cell sarcoma of the thyroid gland coexisting with Hashimoto's thyroiditis. *International journal of surgical pathology*. 2011;19:502-505.
 218. Chan JK, Fletcher CD, Nayler SJ, Cooper K. Follicular dendritic cell sarcoma. Clinicopathologic analysis of 17 cases suggesting a malignant potential higher than currently recognized. *Cancer*. 1997;79:294-313.
 219. Perkins SM, Shinohara ET. Interdigitating and follicular dendritic cell sarcomas: a SEER analysis. *American journal of clinical oncology*. 2013;36:395-398.
 220. Perez-Ordóñez B, Erlandson RA, Rosai J. Follicular dendritic cell tumor: report of 13 additional cases of a distinctive entity. *The American journal of surgical pathology*. 1996;20:944-955.
 221. Williams TP, Raess PW, Brazier R, Cascio MJ. Primary Extranodal Nodular Lymphocyte Predominant Hodgkin Lymphoma Involving the Thyroid. *Head and neck pathology*. 2019.
 222. Graff-Baker A, Roman SA, Thomas DC, Udelsman R, Sosa JA. Prognosis of primary thyroid lymphoma: demographic, clinical, and pathologic predictors of survival in 1,408 cases. *Surgery*. 2009;146:1105-1115.
 223. Wolf BC, Sheahan K, DeCoste D, Variakojis D, Alpern HD, Haselow RE. Immunohistochemical analysis of small cell tumors of the thyroid gland: an Eastern Cooperative Oncology Group study. *Human pathology*. 1992;23:1252-1261.
 224. Ohsawa M, Noguchi S, Aozasa K. Immunologic type of thyroid lymphoma in an adult T-cell leukemia endemic area in Japan. *Leukemia & lymphoma*. 1995;17:341-344.
 225. Pedersen RK, Pedersen NT. Primary non-Hodgkin's lymphoma of the thyroid gland: a population based study. *Histopathology*. 1996;28:25-32.
 226. Adhikari LJ, Reynolds JP, Wakely PE, Jr. Multi-institutional study of fine-needle aspiration for thyroid lymphoma. *Journal of the American Society of Cytopathology*. 2016;5:170-176.
 227. Ruggiero FP, Fraunhofer E, Stack BC, Jr. Thyroid lymphoma: a single institution's experience. *Otolaryngology--head and neck surgery : official journal of American Academy of Otolaryngology-Head and Neck Surgery*. 2005;133:888-896.
 228. Chai YJ, Hong JH, Koo do H, et al. Clinicopathological characteristics and treatment outcomes of 38 cases of primary thyroid lymphoma: a multicenter study. *Annals of surgical treatment and research*. 2015;89:295-299.
 229. Stein SA, Wartofsky L. Primary thyroid lymphoma: a clinical review. *The Journal of clinical endocrinology and metabolism*. 2013;98:3131-3138.
 230. Hyjek E, Isaacson PG. Primary B cell lymphoma of the thyroid and its relationship to Hashimoto's thyroiditis. *Human pathology*. 1988;19:1315-1326.
 231. Watanabe N, Noh JY, Narimatsu H, et al. Clinicopathological features of 171 cases of primary thyroid lymphoma: a long-term study involving 24553 patients with Hashimoto's disease. *British journal of haematology*. 2011;153:236-243.
 232. Calandra DB, Shah KH, Lawrence AM, Paloyan E. Total thyroidectomy in irradiated patients. A twenty-year experience in 206 patients. *Annals of surgery*. 1985;202:356-360.
 233. Vardell Noble V, Ermann DA, Griffin EK, Silberstein PT. Primary Thyroid Lymphoma: An Analysis of the National Cancer Database. *Cureus*. 2019;11:e4088.
 234. Zeki K, Eto S, Fujihira T, et al. Primary malignant lymphoma of the thyroid in a patient with long-stan-

- ding Graves' disease. *Endocrinologia japonica*. 1985;32:435-440.
235. Jennings AS, Saberi M. Thyroid lymphoma in a patient with hyperthyroidism. *The American journal of medicine*. 1984;76:551-552.
 236. Wang Z, Fu B, Xiao Y, Liao J, Xie P. Primary thyroid lymphoma has different sonographic and color Doppler features compared to nodular goiter. *Journal of ultrasound in medicine : official journal of the American Institute of Ultrasound in Medicine*. 2015;34:317-323.
 237. Orita Y, Sato Y, Kimura N, et al. Characteristic ultrasound features of mucosa-associated lymphoid tissue lymphoma of the salivary and thyroid gland. *Acta oto-laryngologica*. 2014;134:93-99.
 238. Nam M, Shin JH, Han BK, et al. Thyroid lymphoma: correlation of radiologic and pathologic features. *Journal of ultrasound in medicine : official journal of the American Institute of Ultrasound in Medicine*. 2012;31:589-594.
 239. Kim HC, Han MH, Kim KH, et al. Primary thyroid lymphoma: CT findings. *European journal of radiology*. 2003;46:233-239.
 240. Gupta N, Nijhawan R, Srinivasan R, et al. Fine needle aspiration cytology of primary thyroid lymphoma: a report of ten cases. *CytoJournal*. 2005;2:21.
 241. Nguyen GK, Lee MW, Ginsberg J, Wragg T, Bilodeau D. Fine-needle aspiration of the thyroid: an overview. *CytoJournal*. 2005;2:12.
 242. Swart GJ, Wright C, Brundyn K, et al. Fine needle aspiration biopsy and flow cytometry in the diagnosis of lymphoma. *Transfusion and apheresis science : official journal of the World Apheresis Association : official journal of the European Society for Haemapheresis*. 2007;37:71-79.
 243. Harvey JN, Parker D, De P, Shrimali RK, Otter M. Sonographically guided core biopsy in the assessment of thyroid nodules. *Journal of clinical ultrasound : JCU*. 2005;33:57-62.
 244. Stein H, Lennert K, Feller AC, Mason DY. Immunohistological analysis of human lymphoma: correlation of histological and immunological categories. *Advances in cancer research*. 1984;42:67-147.
 245. Slack GW, Steidl C, Sehn LH, Gascoyne RD. CD30 expression in de novo diffuse large B-cell lymphoma: a population-based study from British Columbia. *British journal of haematology*. 2014;167:608-617.
 246. Kramer MH, Hermans J, Parker J, et al. Clinical significance of bcl2 and p53 protein expression in diffuse large B-cell lymphoma: a population-based study. *Journal of clinical oncology : official journal of the American Society of Clinical Oncology*. 1996;14:2131-2138.
 247. de Leval L, Ferry JA, Falini B, Shipp M, Harris NL. Expression of bcl-6 and CD10 in primary mediastinal large B-cell lymphoma: evidence for derivation from germinal center B cells? *The American journal of surgical pathology*. 2001;25:1277-1282.
 248. Katzenberger T, Lohr A, Schwarz S, et al. Genetic analysis of de novo CD5+ diffuse large B-cell lymphomas suggests an origin from a somatically mutated CD5+ progenitor B cell. *Blood*. 2003;101:699-702.
 249. Swerdlow SH, Campo E, Pileri SA, et al. The 2016 revision of the World Health Organization classification of lymphoid neoplasms. *Blood*. 2016;127:2375-2390.
 250. Derringer GA, Thompson LD, Frommelt RA, Bijwaard KE, Hefless CS, Abbondanzo SL. Malignant lymphoma of the thyroid gland: a clinicopathologic study of 108 cases. *The American journal of surgical pathology*. 2000;24:623-639.
 251. Mertens de Wilmars M, Knoops L, Sempoux C, et al. Solitary extramedullary plasmacytoma of the thyroid: a case report and histological approach to plasma cells infiltrate in the thyroid gland. *Acta clinica Belgica*. 2015;70:133-137.
 252. Galièni P, Cavo M, Pulsoni A, et al. Clinical outcome of extramedullary plasmacytoma. *Haematologica*. 2000;85:47-51.
 253. Rubin J, Johnson JT, Killeen R, Barnes L. Extramedullary plasmacytoma of the thyroid associated with a serum monoclonal gammopathy. *Archives of otolaryngology--head & neck surgery*. 1990;116:855-859.
 254. Gochhait D, Govindarajalou R, Kar R, Rangarajan V, Dehuri P, Dubashi B. Plasmacytoma of thyroid clinically and morphologically mimicking primary thyroid carcinoma. *Cytopathology : official journal of the British Society for Clinical Cytology*. 2019;30:113-116.
 255. Sahu KK, Singh P, Malhotra P, Srinivasan R. Thyroid Plasmacytoma: A Rare Cause of Hoarseness of Voice. *Indian journal of nuclear medicine : the official journal of the Society of Nuclear Medicine, India*. 2019;34:78-80.
 256. Vilallonga R, Zafon C, Ruiz-Marcellan C, et al. Malignant thyroid teratoma: report of an aggressive tumor in a 64-year-old man. *Endocrine pathology*. 2013;24:132-135.
 257. Thompson LD, Rosai J, Hefless CS. Primary thyroid teratomas: a clinicopathologic study of 30 cases. *Cancer*. 2000;88:1149-1158.
 258. Ting J, Bell D, Ahmed S, et al. Primary Malignant Thyroid Teratoma: An Institutional Experience. *Thyroid : official journal of the American Thyroid Association*. 2019;29:229-236.
 259. Starling CE, Sabra J, Brady B, Horton M, Traweek ST. Malignant teratoma of the thyroid: A difficult diagnosis by fine-needle aspiration. *Diagnostic cytopathology*. 2019.
 260. Rabinowits G, Barletta J, Sholl LM, Reche E, Lorch J, Goguen L. Successful Management of a Patient with Malignant Thyroid Teratoma. *Thyroid : official journal of the American Thyroid Association*. 2017;27:125-128.
 261. Carney JA, Ryan J, Goellner JR. Hyalinizing trabecular adenoma of the thyroid gland. *The American journal of surgical pathology*. 1987;11:583-591.
 262. Jones DJ, Kieliszak CR, Patel SS, Selinsky CR. Hyalinizing trabecular tumor of the thyroid gland and its significant diagnostic issue. *Thyroid research*. 2017;10:7.
 263. Gowrishankar S, Pai SA, Carney JA. Hyalinizing trabecular carcinoma of the thyroid gland. *Histopathology*. 2008;52:529-531.
 264. Dell'Aquila M, Gravina C, Coco-

- mazzi A, et al. A large series of hyalinizing trabecular tumors: Cytomorphology and ancillary techniques on fine needle aspiration. *Cancer cytopathology*. 2019.
265. Nikiforova MN, Nikitski AV, Panebianco F, et al. GLIS Rearrangement is a Genomic Hallmark of Hyalinizing Trabecular Tumor of the Thyroid Gland. *Thyroid: official journal of the American Thyroid Association*. 2019;29:161-173.
266. Saglietti C, Piana S, La Rosa S, Bongiovanni M. Hyalinizing trabecular tumour of the thyroid: fine-needle aspiration cytological diagnosis and correlation with histology. *Journal of clinical pathology*. 2017;70:641-647.
267. Takada N, Hirokawa M, Ohbayashi C, et al. Re-evaluation of MIB-1 immunostaining for diagnosing hyalinizing trabecular tumour of the thyroid: semi-automated techniques with manual antigen retrieval are more accurate than fully automated techniques. *Endocrine journal*. 2018;65:239-244.
268. Carney JA, Hirokawa M, Lloyd RV, Papotti M, Sebo TJ. Hyalinizing trabecular tumors of the thyroid gland are almost all benign. *The American journal of surgical pathology*. 2008;32:1877-1889.
269. Kishimoto Y, Kishimoto AO, Yamada Y, et al. Dedifferentiated liposarcoma of the thyroid gland: A case report. *Molecular and clinical oncology*. 2019;11:219-224.
270. Liao H, Khan A, Miron PM, Cornejo KM. Mammary Analogue Secretory Carcinoma of the Thyroid Mimicking Locally Advanced Papillary Thyroid Carcinoma: A Rare Case Report. *International journal of surgical pathology*. 2018;26:459-463.
271. Owen C, Constantinidou A, Miah AB, et al. Synovial Sarcoma of the Thyroid Gland, Diagnostic Pitfalls and Clinical Management. *Anticancer research*. 2018;38:5275-5282.
272. Chirila M, Muresan M, Ciuleanu E, Cosgarea M. Extrasosseous Ewing sarcoma and peripheral primitive neuroectodermal tumor of the thyroid gland: Case report and review. *Ear, nose, & throat journal*. 2013;92:E3-6.
273. D'Antonio A, Orabona P, Caleo A, Addesso M, Liguori G, Boscaino A. Primary rhabdoid tumor of thyroid gland. Description of a rare entity with molecular study. *Pathology international*. 2010;60:644-646.
274. Dutta M, Chatterjee I, Roy S, Gure PK. Primary embryonal rhabdomyosarcoma of the anterior neck and thyroid: report of a new case with review of the literature. *The Laryngoscope*. 2013;123:2072-2076.
275. Chen Q, Huang Q, Yan JX, Li C, Lang JY. Primary undifferentiated pleomorphic sarcoma of the thyroid: A case report and review of the literature. *Medicine*. 2018;97:e9927.
276. Ono M, Kasuga Y, Uehara T, Oda Y. Epithelioid hemangioendothelioma of the thyroid: a case report. *Surgical case reports*. 2017;3:18.
277. Barczynski M, Jamski J, Cichon S, Barczynski M, Sulowicz W. [Diagnosis, treatment and prognosis in cases of renal clear cell carcinoma metastases into the thyroid gland]. *Przegląd lekarski*. 2000;57:157-159.
278. Lam KY, Lo CY. Metastatic tumors of the thyroid gland: a study of 79 cases in Chinese patients. *Archives of pathology & laboratory medicine*. 1998;122:37-41.
279. Zhang L, Liu Y, Li X, Gao W, Zheng C. Metastases to the thyroid gland: A report of 32 cases in PUMCH. *Medicine*. 2017;96:e7927.
280. Chung AY, Tran TB, Brumund KT, Weisman RA, Bouvet M. Metastases to the thyroid: a review of the literature from the last decade. *Thyroid: official journal of the American Thyroid Association*. 2012;22:258-268.
281. Duggal NM, Horattas MC. Metastatic renal cell carcinoma to the thyroid gland. *Endocrine practice: official journal of the American College of Endocrinology and the American Association of Clinical Endocrinologists*. 2008;14:1040-1046.
282. Nakhjavani MK, Gharib H, Goeliner JR, van Heerden JA. Metastasis to the thyroid gland. A report of 43 cases. *Cancer*. 1997;79:574-578.
283. Hegerova L, Griebeler ML, Reynolds JP, Henry MR, Gharib H. Metastasis to the thyroid gland: report of a large series from the Mayo Clinic. *American journal of clinical oncology*. 2015;38:338-342.
284. Willis RA. Metastatic Tumours in the Thyroid Gland. *The American journal of pathology*. 1931;7:187-208 183.
285. Wychulis AR, Beahrs OH, Woolner LB. Metastasis of Carcinoma to the Thyroid Gland. *Annals of surgery*. 1964;160:169-177.
286. Mattavelli F, Collini P, Pizzi N, et al. Thyroid as a target of metastases. A case of foregut neuroendocrine carcinoma with multiple abdominal metastases and a thyroid localization after 21 years. *Tumori*. 2008;94:110-113.
287. Bohn OL, De las Casas LE, Leon ME. Tumor-to-tumor metastasis: Renal cell carcinoma metastatic to papillary carcinoma of thyroid-report of a case and review of the literature. *Head and neck pathology*. 2009;3:327-330.
288. Mizukami Y, Saito K, Nonomura A, et al. Lung carcinoma metastatic to microfollicular adenoma of the thyroid. A case report. *Acta pathologica japonica*. 1990;40:602-608.
289. Giorgadze T, Ward RM, Baloch ZW, LiVolsi VA. Phyllodes tumor metastatic to thyroid Hurthle cell adenoma. *Archives of pathology & laboratory medicine*. 2002;126:1233-1236.
290. Yoon JH, Kim EK, Kwak JY, Moon HJ, Kim GR. Sonographic features and ultrasonography-guided fine-needle aspiration of metastases to the thyroid gland. *Ultrasonography*. 2014;33:40-48.
291. Takashima S, Takayama F, Wang JC, et al. Radiologic assessment of metastases to the thyroid gland. *Journal of computer assisted tomography*. 2000;24:539-545.
292. Papi G, Fadda G, Corsello SM, et al. Metastases to the thyroid gland: prevalence, clinicopathological aspects and prognosis: a 10-year experience. *Clinical endocrinology*. 2007;66:565-571.