

Cutaneous Angiosarcoma

Larisa P Wibawa, Riani Laurensia, Adhimukti T Sampurna, Roro Inge Ade Krisanti



e-ISSN 2797-457X
DOI: 10.52830/inajcc.v4i3.138

Received: December 3, 2025
Accepted: February 6, 2026

Authors' affiliations:
Department of Dermatology and
Venereology, Faculty of
Medicine, University of
Indonesia
Dr. Cipto Mangunkusumo
Hospital, Jakarta, Indonesia

Corresponding author:
Email: rianilaurensia13@gmail.com

Abstract

Cutaneous angiosarcoma (cAS) is a rare but highly aggressive malignant vascular neoplasm originating from endothelial cells and accounting for approximately 1–2% of all soft tissue sarcomas. The disease predominantly affects elderly individuals and most commonly involves the skin of the head and neck region. Cutaneous angiosarcoma may occur sporadically (Wilson–Jones type) or in association with chronic lymphedema (Stewart–Treves syndrome) and previous radiation exposure. Early diagnosis remains challenging because its clinical manifestations are highly variable and often mimic benign inflammatory, vascular, or traumatic conditions, leading to delayed recognition and treatment. This review summarizes the current understanding of cutaneous angiosarcoma, including its epidemiology, risk factors, pathogenesis, clinical manifestations, diagnostic evaluation, management, prognosis, and follow-up. Diagnostic approaches rely on a combination of clinical assessment, dermoscopy, histopathological examination, immunohistochemistry, and imaging studies to establish the diagnosis and determine disease extent. Surgical resection remains the mainstay of treatment and is frequently combined with radiotherapy and systemic therapies for advanced disease. Novel therapeutic modalities, including targeted therapy, immunotherapy, and electrochemotherapy, have emerged as promising options for selected patients. Despite advances in treatment, the prognosis of cutaneous angiosarcoma remains poor because of its aggressive behavior, high recurrence rate, and metastatic potential. Increased awareness and early recognition are essential to facilitate timely diagnosis and optimize patient outcomes.

Keywords: *angiosarcoma, cutaneous angiosarcoma, soft tissue sarcoma*

Abstrak

Angiosarkoma kutaneus (*cutaneous angiosarcoma/cAS*) merupakan neoplasma vaskular ganas yang jarang tetapi sangat agresif, berasal dari sel endotel, dan mencakup sekitar 1–2% dari seluruh sarkoma jaringan lunak. Penyakit ini terutama terjadi pada individu lanjut usia dan paling sering mengenai kulit di daerah kepala dan leher. Angiosarkoma kutaneus dapat terjadi secara sporadik (tipe Wilson–Jones) atau berhubungan dengan limfedema kronis (sindrom Stewart–Treves) maupun riwayat paparan radiasi sebelumnya. Diagnosis dini masih menjadi tantangan karena manifestasi klinisnya sangat bervariasi dan sering menyerupai kondisi inflamasi, vaskular, atau traumatik yang jinak, sehingga dapat menyebabkan keterlambatan dalam pengenalan dan penatalaksanaan. Tinjauan ini merangkum pemahaman terkini mengenai angiosarkoma kutaneus, termasuk epidemiologi, faktor risiko, patogenesis, manifestasi klinis, evaluasi diagnostik, tata laksana, prognosis, dan tindak lanjut. Pendekatan diagnostik mengandalkan kombinasi penilaian klinis, dermoskopi, pemeriksaan histopatologi, imunohistokimia, dan pemeriksaan pencitraan untuk menegaskan diagnosis serta menentukan luas penyakit. Reseksi bedah tetap menjadi terapi utama dan sering dikombinasikan dengan radioterapi serta terapi sistemik pada penyakit lanjut. Modalitas terapi baru, termasuk terapi target, imunoterapi, dan elektrokemoterapi, telah berkembang sebagai pilihan yang menjanjikan pada pasien terpilih. Meskipun terdapat kemajuan dalam terapi, prognosis angiosarkoma kutaneus tetap buruk karena sifatnya yang agresif, angka kekambuhan yang tinggi, dan potensi metastasis. Peningkatan kewaspadaan serta pengenalan dini sangat penting untuk memfasilitasi diagnosis yang tepat waktu dan mengoptimalkan luaran pasien.

Kata kunci: *angiosarkoma, angiosarkoma kutaneus, sarkoma jaringan lunak*

Background

Angiosarcoma (AS) is a highly aggressive malignancy of vascular endothelial cells with a predilection for superficial soft tissue and skin.^{1,2} The clinical term for AS in the skin is called cutaneous angiosarcoma (cAS).¹⁻³ Tumors can originate from various other anatomical locations such as the scalp, breast, and extremities.⁴ The prevalence of AS ranges from 1-2% of all soft tissue sarcomas.² Diagnosis of cAS is a challenge, because the clinical manifestations are nonspecific.⁵ Surgical resection followed by adjuvant radiotherapy is the main treatment option, but there is a high risk of local recurrence and metastasis.^{2,6} Chemotherapy is given for advanced regional cAS or metastatic conditions.^{5,6} Various other modalities such as targeted therapy, immunotherapy, and electrochemotherapy are starting to be developed to improve clinical response and short-term outcomes.¹⁻³

This literature review discusses the definition, epidemiology, risk factors, clinical features, diagnostics, management, prognosis, and follow-up of cAS, excluding AS that occurs in internal organ.

Definition

The term AS is an aggressive malignant tumor of vascular endothelial cells with a predilection primarily for the face and scalp, especially in the geriatric population (Wilson-Jones type AS) originating from the dermis and can progress to the subcutaneous.^{5,7,8} Tumor cells are susceptible to metastasis through blood vessels and the lymphatic system.⁷ In general, AS is grouped into primary AS and secondary AS. Secondary AS is usually associated with a history of radiotherapy and chronic lymphedema.⁹ Other divide AS as cAS, AS associated with lymphedema (Stewart-Treves syndrome), and radiation-associated AS (RAA).⁹

Epidemiology

The prevalence of soft tissue sarcoma in the head and neck ranges from less than 5%, which 10% are classified as AS.⁸ The predilection for cAS is 60% in the head and neck. The ratio between men and women is reported to be around 2:1, with a mean age at diagnosis of 65-70 years.^{1,9,10} As many as 93.5% of AS lesions in the head and neck manifest on the skin, while 6.5% are noncutaneous AS found in the nasopharynx, oropharynx, and peripheral nerves.⁹ The predilection of cAs in the head and neck is common in the male geriatric population, and accounts for 0.1% of all head and neck malignancies.^{1,3} The

latency period between radiation and the development of cAS is 2-30 years, with the periode of 5 years which is shorter than the development of other radiation-induced neoplasms.^{1,11} The development of AS in chronic lymphedema represents about 5% of all AS. The majority of reported cases have occurred in the upper extremities following radical mastectomy for locally advanced breast cancer with a latency period of 10-15 years.^{1,11}

Pathogenesis

Risk factors for AS include chronic lymphedema, radiation, and chronic sun exposure.^{1,10} Other factors include genetic syndromes, exposure to carcinogens such as thorium dioxide, arsenic, and vinyl chloride.^{12,13} Chronic lymphedema following breast cancer therapy, filariasis or Milroy's disease is associated with AS due to accumulation of protein-rich interstitial fluid that inter-feres with the immune response, resulting in stimulation of lymphangiogenesis and collateral blood vessel growth.^{1,11,13} This type of AS has also been reported in patients with congenital lymphedema, filariasis, and morbid obesity.¹⁰ Upregulation of the NTSR1, ANKRD1, and CDKN2C genes is associated with primary cAS while UNC5A, CTLA4, ISLR2, ICOS, RAB17, FLT4, and RASGRP3 have been identified in secondary cAS.¹

Radiotherapy is an independent risk factor for the development of cAS, contributing to almost a quarter of all cases. This is consistent with various types of cancer treated with radiation, such as cervical cancer, endometrial cancer, lymphoma, and breast cancer.¹³ The predilection for RAA is mainly found in the edge of the area exposed to radiation.¹² Breast cancer it occurs within 5 years after radiation, while in body locations other than the breast tend to occur within 10 years after the diagnosis of primary cancer.¹³ There is a genetic predisposition for the development of AS after radiotherapy, namely upregulation of genes such as MYC, KIT, FLT4, and RET and downregulation of CDKN2C have been reported in RAA.^{1,8}

Several familial syndromes associated with AS include neurofibromatosis type 1, Maffucci syndrome, bilateral retinoblastoma, hemochromatosis, and Klippel-Trenaunay syndrome. Although rare, several studies have documented that AS can develop in port wine stains, hemangiomas, and lymphangiomas.¹³ Mutations in the genes involved are TP53, KRAS, PTPRB, and PLCG1. Mutations in the TP53 gene, which is responsible for the synthesis of the

tumor suppressor protein p53. PTPRB and PLCG1 genes play an important role in activating angiogenesis. A novel fusion gene, NUP160-SCL43A3, was identified in 9 of 25 cases of AS, which plays a role in regulating other genes in angiogenesis.¹

The occurrence of cAS in post-renal transplant patients raises the suspicion that immunosuppression is a risk factor for the development of cAS.¹³ Also, xeroderma pigmentosum and HIV can also be found in cAS.¹ However, the exact pathogenesis is still unclear. Neoplasms developing in hemodialysis fistulas in immunocompetent patients have also been reported, indicating that vascular flow abnormalities may trigger neovas-culogenesis.^{1,13}

Clinical Features

The clinical presentation of cAS is highly variable.⁷ Initially, AS appears as a benign vascular tumor with a predilection for the face, scalp, and neck.^{2,8} The initial clinical presentation of cAS is nonspecific, presenting with erythema and hematoma on chronically sun-exposed skin (Figure 1). The presentation resembles rosacea, dermatitis, hemangioma, xanthelasma, cellulitis, and angioedema.¹ Some cases show a reddish-black border with bleeding into the skin, making it appear like "ink being soaked up by blotting paper."¹⁰



Figure 1. Angiosarcoma on the scalp of an elderly. (Archieve Skin Tumor and Surgery Division, Dermatology and Venereology Department, Cipto Mangunkusumo Hospital)

Lesions can develop into nodules, exophytic tumors, ulcerations, and hemorrhages, resembling epithelial neoplasms such as squamous cell carcinoma, kerato-acanthoma, basal cell carcinoma, atypical fibroxanthoma, and malignant melanoma.² cAS lesions are multifocal and extend beyond the clinically visible lesion boundaries, making it challenging to determine

the extent of cAS.¹ On physical examination, head tilt maneuver can increase blood supply, thus helping visualize the tumor.^{1,10}

In Stewart-Treves syndrome, there is dusky erythema in lymphedema.¹⁰ Systemic symptoms can occur in all cAS variants such as abdominal pain, nausea, vomiting, and changes in bowel motility. In cases of metastasis, there will be symptoms according to the organs involved.¹⁴

Diagnostics

Diagnostic evaluation of cAS cases includes dermoscopy, skin biopsy, immunohistochemistry (IHC). Imaging such as ultrasonography (USG) and magnetic resonance imaging (MRI) may determine the extent of the primary lesion before surgery. Computed tomography scan (CT scan) and positron emission tomography (PET) examinations to detect metastasis.^{8-10,13}

Multipel atypical vascular structure is one of the key dermoscopy features of cAS. The dermoscopic appearance that can be found in cAS is dark red and pulp structureless zone on a light red background, violet hue, thick white, perpendicular, and polygonal lines in all lesions. In the center of the lesion, there are dark red, purple dots, and clods dots around follicular openings, which look like white and yellow circles.¹⁵ In RAA, it shows a more homogeneous reddish white pattern.¹⁶



Figure 2. Multiple atypical vascular structure is one of dermoscopy key feature of cAS. (Archieve Skin Tumor and Surgery Division, Dermatology and Venereology Department, Cipto Mangunkusumo Hospital)

There are three ways to obtain histopathological specimens, namely 1) tumor resection and biopsy followed by surgery; 2) frozen section followed by wide resection; and 3) hollow needle puncture

performed before surgery.^{10,14} Image of irregular blood vessels in the dermis and atypical endothelial cells lining the blood vessel space will be the most common pathological appearance (Figure 3).

In well-differentiated AS, the functional and morphological properties of the vascular endothelium are normal, there are many irregular blood vessels lined by endothelial cells.¹ In poorly differentiated AS, the tumor consists of cells with hyperchromatic pleomorphic nuclei, and variety of shapes, including round, epithelioid, polygonal, spindle-shaped primitive cells, along with high mitotic activity. These cells form vascular gaps that invade the connective tissue and subcutaneous tissue.^{1,10,17,18}

The histopathological finding of epithelioid cAS is dominated by round or polygonal cells with eosinophilic cytoplasm, vesicular nuclei, with nodular, micro-nodular, syncytial, and diffuse growth patterns and necrosis zones.^{1,18} Hypertrophic and papillomatous cAS are described as verrucous cAS.¹ Another rare case is pseudolymphomatous AS with severe inflammatory infiltrate and variable germinal center formation.¹

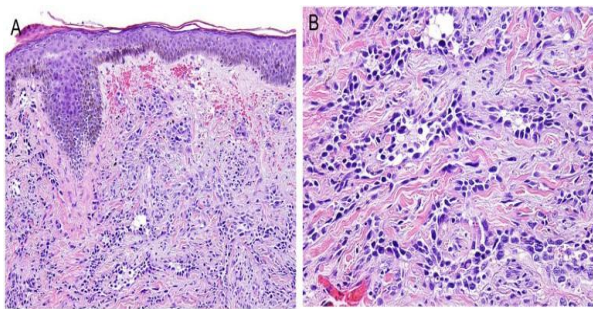


Figure 3. Histopathological examination of well-differentiated cutaneous angiosarcoma.¹

- A. Irregular blood vessels in the dermis (H&E, 10×).
- B. Atypical endothelial cells lining the vascular space

The most commonly used IHC markers for the diagnosis of cAS are CD31 and CD34.^{1,10} The CD31 marker (positivity rate 80%) has high sensitivity and specificity, with a diffuse, intense staining reaction and accentuation of the cytoplasmic membrane, but CD31 is also expressed in macrophages, histiocytes, and plasma cells. The markers CD34 (positivity rate 63%) and factor VII (positivity rate 83%) are also expressed in cAS, but are absent in poorly differentiated tumors, but CD34 can also be expressed in hematopoietic and fibrohistiocytic cells.^{1,2,10,17}

Nuclear IHC markers, such as ERG which is a homolog

of the Avian v-ets erythroblastosis virus E26 oncogene and FLI1 are highly sensitive for cAS, but FLI1 can also be found in leiomyosarcoma, squamous cell carcinoma, melanoma, and atypical fibroxanthoma.^{1,9} Claudin-5, a tight junction protein, is another sensitive vascular marker if additional confirmation of vascular origin is needed. This protein shows positive expression in most cases of cAS, but is not specific because it can be expressed by other vascular proliferations.¹ Lymphatic endothelial markers expressed in cAS are podoplanin D2-40, LYVE-1, c-MYC, PROX-1, and α -SMA. Strong ki67 positivity indicates a poor prognosis.⁹ Increased expression of the c-MYC oncogene through gene amplification is characteristic of RAA.¹⁰

Ultrasonography (USG) is primarily used to detect effusion and lesions in internal organs such as the liver, it can also serve as an initial imaging modality to assess superficial soft tissue involvement, including lymph nodes, in angiosarcoma.¹⁴ Meanwhile, MRI offers superior tissue characterization and differentiation between tumor mass and thrombus, making it useful for evaluating angiosarcoma not only in solid organs like the heart and liver, but also in lymphatic or subcutaneous tissues.¹⁴ Characteristic MRI findings include high-flow serpentine vessels within a dense, non-specific soft tissue mass, with contrast enhancement and non-enhancing areas indicating tumor necrosis.¹⁴ MRI is superior to CT scan in differentiating thrombus and tumor mass with tissue characterization.^{13,14} Diagnostic findings on MRI are high-flow serpentine vessels in a non-specific dense soft tissue mass with enhancement after intravenous contrast administration and non-enhancing areas that identify tumor necrosis.¹³

Regional spread or distant metastases are common in AS, occurring in 30% and 10% of cases, respectively.¹¹ Staging and grading of the primary tumor (T), regional lymph nodes (N), and distant metastases (M), and tumor grade (G) are used to classify soft tissue sarcomas according to the 8th edition of the revised American Joint Committee on Cancer (AJCC) cancer staging guidelines (Appendix, Table 1) adopting the grading system published by the French Federation of Cancer Centers Sarcoma Group (FNCLCC). Tumor grading is based on cell differentiation, mitotic rate, and extent of necrosis (Appendix, Table 2).^{10,19} The AS staging system varies depending on location, whether in the head and neck area, or in the trunk and extremities.^{10,20}

Table 1. TNM classification of soft tissue sarcomas in the head and neck region according to The American Joint Committee on Cancer Staging Manual 8th edition.¹⁰

Primary Tumor (T)	
TX	Primary tumor cannot be measured
T1	Tumor ≤ 2 cm
T2	Tumor > 2 cm to ≤ 4 cm
T3	Tumor > 4 cm
T4	Tumor invading surrounding anatomical structures
T4a	Tumor invading the orbita, base of the skull/dura mater, central organs of the head, the facial skull, the pterygoid muscles
T4b	Tumor invading the CNS, with the carotid sheath, invading the paravertebral muscle, or invading the CNS via perineural spreading
Regional lymph nodes (N)	
NX	Regional lymph nodes cannot be assessed
N0	No nodal metastasis
N1	Regional lymph nodes metastasis
Distant Metastasis (M)	
M0	No distant metastasis
M1	Distant metastasis

Table 2. Histologic grading of soft tissue sarcoma according to the American Joint Committee on Cancer Staging Manual 8th edition.¹⁰

Tumor differentiation	Number of mitosis	Tumor necrosis
Sarcoma shows strong similarities to normal adult tissue (for example low-malignancy leiomyosarcoma) (1 point)	0–9 mitosis per 10 HPF (1 point)	No tumor necrosis (0 point)
Sarcoma with distinct histological typing (for example myxoid round cell liposarcoma) (2 points)	10-19 mitosis/10 HPF (2 points)	< 50% nekrosis tumor (1 point)
Embryonal and non-differentiated sarcoma, sarcomas of questionable type, synovial sarcomas, soft tissue osteosarcoma, Ewing sarcoma/soft tissue primitive neuroectodermal tumor (PNET) (3 points)	≥ 20 mitosis/10 HPF (3 points)	≥ 50% nekrosis tumor (2 point)
The score of these variables are added up, resulting in the following grades		
GX	Grade cannot be assessed	
G1	Total score 2-3	
G2	Total score 4-5	
G3	Total score 6 or higher	

HPF: high power field

Management

A. Local Therapy

Surgery

Radical surgical resection is the main therapy for primary and recurrent cAS.^{1,10,11} Although there are no clear guidelines regarding the specific width of surgical margins in cAS, it is recommended to achieve

a margin of at least 3 cm or more and a deep margin.^{1,21} Rapid tumor growth and disease extension cause surgical margins to remain positive after resection.^{10,14} In head and neck cAS, surgical resection is not recommended due to the complex anatomical structure and risk of metastasis. Local recurrence and distant metastasis can occur as much as 30% - 100% after radical surgical resection.¹⁴

Radiotherapy

Definitive radiotherapy is used for tumors that cannot be surgically treated such as cAS in the head and neck. Because there are few previous studies on definitive radiotherapy for AS, the optimal radiotherapy management remains unclear.¹⁴ Radiotherapy with an average dose of 70 Gy can achieve local tumor control in approximately 50% of cases.¹⁰ Radiotherapy can be given as an adjuvant to surgical therapy in localized AS. The dose of radiotherapy as an adjuvant therapy in cAS surgery is 60 Gy, divided into 20 sessions. In RAA, the dose given is lower, namely 45-50 Gy.²⁰ In recurrent tumors, debulking or repeat resection can be performed followed by normofractionated and hyper fractionated radiotherapy or local brachytherapy.¹⁰

B. Systemic Therapy

Neoadjuvant chemotherapy is considered for palliative care, especially to preserve organ function in cAS with a predilection for the eye.^{10,20} Chemotherapy is also widely used in metastatic cAS and unresectable lesions.¹ A trend towards improved survival from chemotherapy treatment has not been proven so far, but a good response to chemotherapy is seen in subgroups with excellent local tumor control.¹⁰

Chemotherapy

The most commonly used chemotherapy for cAS is docetaxel, paclitaxel, and liposomal doxorubicin, but the National Comprehensive Cancer Network (NCCN) guidelines also include the use of vinorelbine, sorafenib, sunitinib, and bevacizumab.¹¹ Doxorubicin-based regimens are the gold standard for the management of soft tissue sarcomas with a median progression-free survival (PFS) of 3 months, while taxanes (paclitaxel) have shown better efficacy with a median PFS of 4-5 months.¹

Tyrosine kinase inhibitors (pazopanib, sorafenib, axitinib) are used to treat a variety of soft tissue sarcomas, one of which is cAS.¹ Pazopanib is a targeted therapy that was recently approved as a second-line treatment for advanced sarcomas.¹⁰ Pazopanib is a vascular endothelial growth factor receptor (VEGFR) tyrosine kinase inhibitor that approved based on improved PFS compared with placebo in patients with chemotherapy-refractory sarcoma (4.6 months vs. 1.6 months).^{10,22} Pazopanib inhibits the receptors VEGFR-1, VEGFR-2, VEGFR-3, platelet-derived growth factor (PDGFR)- α , PDGFR- β , fibroblast growth factor receptor (FGFR)-1, FGFR-3,

c-KIT proto-oncogene, as well as other kinases such as B-Rapidly accelerated fibrosarcoma (B-RAF) of the MAP kinase pathway. The dose used is generally 800 mg per day orally. Reported side effects include decreased appetite, headache, hypertension, diarrhea, vomiting, hair loss, and exanthema.¹⁰ The combination of pazopanib and paclitaxel has been used for the management of advanced AS with a mean PFS of 11.6 months, but definitive conclusions regarding its use are lacking.²³ Bevacizumab, a VEGFR inhibitor, has been reported to be an option for the treatment of AS with a PFS of 6.5 months. Other therapies include carotuximab, a monoclonal antibody against endoglin, and regorafenib, a VEGFR2-TIE2 tyrosine kinase inhibitor.¹

Another targeted therapy is trabectedin, which has anti-neoplastic and multitargeted properties by inducing apoptosis and cell cycle arrest through binding to the minor groove of DNA and affecting DNA-binding proteins; activating the immune microenvironment by inhibiting monocyte and macrophage differentiation and cytokine production.^{10,24} It has been approved for the treatment of advanced soft tissue sarcoma in adults after failure of other treatments with intravenous administration of 1.5 mg/m² over 24 hours every 3 weeks. Reported side effects include infection, febrile neutropenia, vomiting, and hyperbilirubinemia.¹⁰ The combination of trabectedin with radiotherapy is also an active therapeutic option in patients with soft tissue sarcoma.²⁵

Recombinant IL-2 (rIL2)

Intralesional recombinant IL-2 (rIL2) initiates and maintains differentiation of Th1 and Th2 cells, increases cytolytic activity of natural killer (NK) cells, increases differentiation of regulatory T cells, and anti-tumor activity mediated by cytotoxic T cells, while suppressing Th17 differentiation resulting in complete remission in some cases.¹⁰ The definitive role of rIL2 has not been fully studied, but data suggest a role for the immune response in tumor control.¹⁰

Immunotherapy

Immunotherapy against programmed death 1 (PD-1) and its receptors including ligand-1 (PD-L1) and ligand-2 (PD-L2) is also considered as an effective therapeutic target in malignant tumors.¹⁴ Significant levels of PD-1-expressing T cells infiltration have been found in tumors as well as PD-L1 expression in tumor cells. Although large-scale clinical trials are still lacking, there are several small clinical trials that

have shown the curative effect of anti-PD-1 antibodies for AS.^{10,14} CTLA-4 inhibitors (tremelimumab) can also be given in combination therapy for cAS, although their efficacy is still being proven in phase II trials.²¹

Electrochemotherapy

The efficacy of surgery, radiotherapy, and chemotherapy is still very limited in the management of cAS. In the 2000s, electrochemotherapy was proposed as a potential therapy for superficial malignant lesions. Electrochemotherapy is an effective local therapy based on systemic or local injection of bleomycin or cisplatin combined with electroporation.²⁶ In a retrospective study, electrochemotherapy in 19 cases of advanced AS showed an objective response rate of 63%. Pain and bleeding decreased in one third of patients.²⁷ The International Network for Sharing Practices in Electrochemotherapy (InspECT) study had comparable results, namely in 20 patients with advanced AS, objective tumor response was observed in 80%, half of these cases showed complete remission. Bleeding control was achieved in 13 of 14 patients.²⁸ Electrochemotherapy had a good response in the treated area but new tumors could develop outside the area in less than 2 months.²⁹

Prognosis

The clinical outcome of AS is poor because it is difficult to control the primary tumor with relatively high local recurrence.⁸ A 2015 retrospective study evaluated the outcomes of cAS of the face and scalp

treated with a combination of surgery, radiation therapy, and/or chemotherapy. Among 55 AS patients, approximately 73% received a combination of surgery, radiation therapy, and/or chemotherapy, 15% received surgery, 2% received radiation therapy, 9% received chemotherapy, and 2% were observed. The reported 5-year locoregional tumor control was 18%; the 5-year recurrence-free rate was 16%.⁵ A 2021 retrospective study found that cAS of the scalp had a high local recurrence rate and poor prognosis. Among 41 patients with AS of the scalp, 30 patients had localized lesions and 11 patients had distant metastases. Overall, the mean survival rate was 16.6 months and the 5-year survival rate was 22%.⁷

Psychosocial Rehabilitation And Care

Depression and anxiety are comorbidities in cancer patients, associated with a relatively poor prognosis of cAS.^{30,31} Complex psychological adaptations related to biological, individual, and societal factors contribute to the risk of poor outcomes. Therefore, physical rehabilitation and psychosocial support are important aspects in improving the quality of life in cAS.^{9,30,31}

Follow-Up

Information regarding the specific follow-up time for cAS is not yet available. In the majority of cases, the individual follow-up interval is 6 weeks to 3 months, because AS is very progressive and has a poor prognosis. Imaging procedures are performed for appropriate management, taking into account prognosis, TNM stage, and location of metastases (Table 3).¹⁰

Table 3. Follow-up examinations for cutaneous angiosarcoma.¹⁰

Risk group	Year 1-3	Year 4-5	Year 6-10
Mainly favorable prognostic features (single tumor <5cm, one region, location on the trunk, superficial growth, solid portions, inflammation)	Evaluation every 3 months: clinical examination, biopsy (if applicable), imaging (if applicable)	Evaluation every 6 months: clinical examination, biopsy (if applicable), imaging (if applicable)	Evaluation every 12 months: clinical examination, biopsy (if applicable), imaging (if applicable)
Mainly unfavorable prognostic features (multifocal, satellites, > 5 cm; several regions; advanced age; location head/neck, scalp; deep invasion, no solid portions, high Ki-67, necroses)	Evaluation every six weeks: clinical examination, biopsy (if applicable) In the first three years: additional ultrasound of the locoregional lymph nodes every 3 months and chest CT every 6 months	Evaluation every 3 months: clinical examination, biopsy (if applicable) Only in cases of clinical suspicion of progression beyond the primary location: Imaging (ultrasound, CT, MRI)	Evaluation every 6 months: clinical examination, biopsy (if applicable) Only in cases of clinical suspicion of progression beyond the primary location: Imaging (ultrasound, CT, MRI)

Conclusion

The prevalence of AS is very rare but aggressive and often metastasizes. One of the most common variants of AS is cAS on the face and scalp, especially in the male geriatric population. The most commonly associated risk factors for AS are radiotherapy and chronic lymphedema. The clinical picture of AS is nonspecific, requiring additional examinations such as dermoscopy, histopathology, immunohistochemistry, and radiology. Although surgical resection followed by adjuvant radiotherapy or chemotherapy is the mainstay of cAS management, multimodality approaches such as targeted therapy, electrochemotherapy, and immunotherapy are currently being developed to improve quality of life.

Conflict of interests

The authors have no financial conflict of interest.

References

- Shustef E, Kazlouskaya V, Prieto VG, Ivan D, Aung PP. Cutaneous angiosarcoma: A current update. *J Clin Pathol*. 2017;70(11):917–25.
- Dossett LA, Harrington M, Cruse CW, Gonzalez RJ. Cutaneous angiosarcoma. *Curr Probl Cancer*. 2015;39(4):258–63.
- Ramakrishnan N, Mokhtari R, Charville GW, Bui N, Ganjoo K. Cutaneous angiosarcoma of the head and neck—A retrospective analysis of 47 patients. *Cancers*. 2022;14(15):1–14.
- Colas M, G  razime A, Popescu D, Puzenat E, Chaigneau L, Woronoff AS, et al. Angiosarcoma: A population- based cancer registry descriptive study of 45 consecutive cases diagnosed between 1979 and 2016. *Rare Tumors*. 2020;12:1–5.
- Patel SH, Hayden RE, Hinni ML, Wong WW, Foote RL, Milani S, et al. Angiosarcoma of the scalp and face: The Mayo Clinic Experience. *JAMA Otolaryngol - Head Neck Surg*. 2015;141(4):335–40.
- Conic RRZ, Damiani G, Frigerio A, Tsai S, Bragazzi NL, Chu TW, et al. Incidence and outcomes of cutaneous angiosarcoma: A SEER population-based study. *J Am Acad Dermatol*. 2020;83(3):809–16.
- Kuan CH, Yang HW, Huang HF, Jyuhn LL, Tseng TY, Hsieh JH, et al. Prognostic significance of positive surgical margins for scalp angiosarcoma. *J Formos Med Assoc*. 2021;120:217–25.
- Letsa I, Benson C, Al-Muderis O, Judson I. Angiosarcoma of the face and scalp: Effective systemic treatment in the older patient. *J Geriatr Oncol*. 2014;5(3):276–80.
- Rodrigues JM, Novaes PT, Paula RL, Oliveira MR. Cutaneous angiosarcoma of head and neck: Case report and literature review. *Oral Oncol Rep*. 2023;7:100072.
- Vogt T, M  ller SL, Melchior P, R  be C, Ugurel S, Schimming TT, et al. S1-Guideline cutaneous angiosarcomas – Update 2021. *J Ger Soc Dermatol*. 2021;19(12):1801–12.
- Requena C, Sendra E, Llobart B, Sanmart  n O, Guill  n C, Lavernia J, et al. Cutaneous angiosarcoma: Clinical and pathology study of 16 cases. *Actas Dermo-Sifiliogr  ficas*. 2017;108(5):457–65.
- Cabral AF, Rocha RH, do Amaral AV, Medeiros KB, Nogueira PE, Diniz LM. Cutaneous angiosarcoma: Report of three different and typical cases admitted in a unique dermatology clinic. *An Bras Dermatol*. 2017;92(2):235–8.
- Gaballah AH, Jensen CT, Palmquist S, Pickhardt PJ, Duran A, Broering G, et al. Angiosarcoma: Clinical and imaging features from head to toe. *Br J Radiol*. 2017;90(1075).
- Cao J, Wang J, He C, Fang M. Angiosarcoma: A review of diagnosis and current treatment. *Am J Cancer Res*. 2019;9(11):2303–13.
- Cole DW, Huerta T, Andea A, Tejasvi T. Purpuric plaques—Dermoscopic and histopathological correlation of cutaneous angiosarcoma. *Dermatol Pract Concept*. 2020;10(4):e2020084.
- Bergler-Czop B, Hadasik K, Brzezi  nska WL. Clinical and dermoscopic features of atypical abdominal brachytherapy-induced angiosarcoma. *Postepy Dermatol Alergol*. 2016;33(4):311–3.
- Bajaj S, Sharma P, Sachdev I, Bhardhwaj M. A novel presentation of cutaneous angiosarcoma: A case report and review. *Indian J Med Paediatr Oncol*. 2017;38(3):363–6.
- Cuong PN, Xuan NT, Huy PN, Tung TN, Son NH. Histopathological features of deep soft tissue epithelioid angiosarcoma in the lower extremity: A rare case report. *Am J Case Rep*. 2020;21:1–5.
- Amin MB, Greene FL, Edge SB, Compton CC, Gershengwald JE, Brookland RK, et al. The eighth edition AJCC cancer staging manual: Continuing to build a bridge from a population-based to a more “personalized” approach to cancer staging. *CA Cancer J Clin*. 2017;67(2):93–9.
- Requena C, Alsina M, Morgado CD, Cruz J, Sanmart  n O, Serra GC, et al. Kaposi sarcoma and cutaneous angiosarcoma: Guidelines for diagnosis and treatment. *Actas Dermo-Sifiliogr  ficas Engl*. 2018;109(10):878–87.
- Guan L, Palmeri M, Groisberg R. Cutaneous angiosarcoma: A review of current evidence for treatment with checkpoint inhibitors. *Front Med*. 2023;10(March):1–6.
- Jones RL, Ravi V, Brohl AS, Chawla S, Ganjoo KN, Italiano A, et al. Efficacy and safety of TRC105 plus pazopanib vs pazopanib alone for treatment of patients with advanced angiosarcoma: A randomized clinical trial. *JAMA Oncol*. 2022;8(5):740–7.
- Pink D, Andreou D, Bauer S, Brodowicz T, Kasper B, Reichardt P, et al. Treatment of angiosarcoma with pazopanib and paclitaxel: Results of the eva (evaluation of votrient   in angiosarcoma) phase ii trial of The German Interdisciplinary Sarcoma Group. *Cancers*. 2021;13(6):1–11.

24. Kobayashi H, Iwata S, Wakamatsu T, Hayakawa K, Yonemoto T, Wasa J, et al. Efficacy and safety of trabectedin for patients with unresectable and relapsed soft-tissue sarcoma in Japan: A Japanese Musculoskeletal Oncology Group study. *Cancer*. 2020;126(6):1253–63.
25. Hindi N, García IC, Sánchez CA, Gutierrez A, Peinado J, Rincón I, et al. Trabectedin plus radiotherapy for advanced soft-tissue sarcoma: Experience in forty patients treated at a sarcoma reference center. *Cancers*. 2021;13(7).
26. Parisi S, Gambardella C, Iovino F, Ruggiero R, Lucido FS, Nesta G, et al. Post-irradiation breast angio-sarcoma: All the possible treatments and electrochemotherapy. Case report and literature review. *J Clin Med*. 2024;13(2).
27. Guida M, Campana LG, Curatolo P, Strippoli S, Bonadies A, Grilz G, et al. Local treatment with electrochemotherapy of superficial angiosarcomas: Efficacy and safety results from a multi-institutional retrospective study. *J Surg Oncol*. 2016;114(2):246–53.
28. Zhou G, Mei Z. Electrochemotherapy for advanced cutaneous angiosarcoma: A European Register-based Cohort Study from the International Network for Sharing Practices of Electrochemotherapy (InspECT)-An invited commentary. *Int J Surg*. 2019;72(November):232–3.
29. Cencelj-Arnež R, Novak J, Klevisar Ivancic A, Bosnjak M, Cemazar M, Snoj M. Radiotherapy-associated angiosarcoma in the breast reconstructed by autologous free-flap and treated with electrochemotherapy. *Radiol Oncol*. 2020;55(1):77–81.
30. Kosir U, Bowes L, Taylor RM, Gerrand C, Windsor R, Onasanya M, et al. Psychological adaptation and recovery in youth with sarcoma: A qualitative study with practical implications for clinical care and research. *BMJ Open*. 2020;10(11):1–13.
31. Srikanthan A, Leung B, Shokoohi A, Smrke A, Bates A, Ho C. Psychosocial distress scores and needs among newly diagnosed sarcoma patients: A provincial experience. *Sarcoma*. 2019.