Supplementary Table S1. Data of 27 literature cases with primary cutaneous diffuse large B-cell lymphoma

Authors and year	Sex/age [years]	Location and symptom	Initial therapy			Evolution after initial therapy	Recurrence/ Metastasis/ Progression [months]	Therapies after recurrence/metastasis/ progression	Final evolution and survival [months]
			Surgery	Radiation	Chemotherapy				
Belousova 2009 [1]	M/41	Trunk, superior extremities, and back; plaques, nodules, and garland-like patches	No	No	CHOP (cyclophosphamide, doxorubicin, vincristine, and prednisone)	Complete clearance of the skin eruptions	No	No	No evidence of disease, Alive, 6.6
Deonizio 2012 [2]	F/81	Lower extremities; ulcerated tumour	No	Local radiation	Anthracycline-based chemotherapy	Improvement of the lesion	No	No	Dead, 8
Fernandez-Flores 2011 [3]	F/79	Lower extremities; hard and bluish-coloured tumours	No	No	Systemic rituximab	Partial response	No	R-COP (rituximab, cyclophosphamide, oncovin, and prednisone)	Complete remission, Alive, 13.4
Gimeno 2009 [4]	M/70	Lower extremities; erythematous cutaneous plaques	No	No	Rituximab-EPOCH (etoposide, adriamycin, vincristine, cyclophosphamide and methylprednisolone)	Complete response	19.5, local relapse; 25.5, new cutaneous nodule; 32.5, CNS involvement	Surgical resection of the relapse; Rituximab-GEMOX (gemcitabine + oxaliplatin) to treat new lesions; intrathecal methotrexate, cytarabine and hydrocortisone and systemic chemotherapy (vincristine, methotrexate and cytarabine) to treat CNS involvement	Cutaneous, systemic and CNS remission, Alive, 47.5
Gurumurthy 2015 [5]	F/58	Lower extremities and neck; asymptomatic, small skin nodules	No	No	R-CHOP (rituximab, cyclophosphamide, doxorubicin, vincristine and prednisolone)	Complete resolution of skin nodules	9, metastasis in the brain		Dead, 9
Ho 2009 [6]	F/79	Dusky indurated erythematous plaques on lower extremities; plum-coloured dermal plaque in the breast	No	No	No	No	The lesions on the lower limb progressed with more infiltrative plaques	Palliative chemotherapy treatment with etoposide.	Dead, 5
Itoi 2014 [7]	M/73	Lower extremities; erythema and red-to-brown-coloured, cutaneous nodules	No	No	Rituximab, pirarubicin, cyclophosphamide, vincristine and prednisolone (R-THP-COP)	Completely remitted	No	No	Remained in remission; alive, 60
Jia 2017 [8]	F/56	Breast; scattered red plaques and nodules	Surgical excision of the left breast and dissection of the left axillary lymph nodes	no	R-CHOP chemotherapy (rituximab, cyclophosphamide, epirubicin, vincristine, and prednisone)	Complete remission (CR) with no relapse	No	No	Alive, 36
Jimura 2017 [9]	F/72	Superior extremities; solitary, hard, subcutaneous tumour with poor mobility	The tumour was surgically removed	No	No	Spontaneous regression	No	No	21, alive
Kobold 2010 [10]	F/61	Lower extremities	No	Yes	CHOP	Clinical complete remission (CR)	4.5, local recurrence; 12.5, local and extracutaneous recurrence	isolated limb perfusion with melphalan after local recurrence	CR could not be achieved after the second recurrence, Dead, 18.5

Authors and year	Sex/age [years]	Location and symptom	Initial therapy			Evolution after initial therapy	Recurrence/ Metastasis/ Progression [months]	Therapies after recurrence/metastasis/ progression	Final evolution and survival [months]
			Surgery	Radiation	Chemotherapy				
Lazaris 2006 [11]	M/ middle-aged	Trunk; purplish adjacent cutaneous nodules	No	No	Multi-agent chemotherapy (CHOP as chemoprophylaxis)	Remains free of relapse	No	No	Alive, 18
Liao 2017 [12]	M/92	Head; firm, painless, non-pulsating subcutaneous multiple-nodular huge scalp mass	Subtotal resection of the tumour	No	No	No	6, relapsed in situ	no	Died of dyscrasia; Dead, 24
Liu 2009 [13]	M/79	Lower extremities; cherry red, firm, slightly infiltrated tumours	No	Yes	No	Complete remission	12, relapses of lesions	Irradiation and immunotherapy with recombinant interferon alfa-2b after relapse	The affected limb was amputated due to frequent, uncontrolled relapses; Alive, 18
Marrero-Alemán 2017 [14]	F/83	Lower extremities; orange erythematous nodules	No	No	No	The lesions Regressed 3 months later before starting radiotherapy; but radiotherapy was still finished	No	No	Remains asymptomatic, alive, 12
Milovanovic 2017 [15]	M/46	Trunk (back); red and livid with formation of vesicles on the tumour surface, with haemorrhagic crusts upon drying	Surgical excision of the tumour and nodules	Adjuvant radiotherapy after surgery	No	Without relapse	No	No	Alive, 6
Nagasaka 2016 [16]	F/73	Trunk (axillary region); central, dark-reddish, elevated skin tumour	No	No	Rituximab	Complete remission (CR)	No	No	Alive, 36
Narimatsu 2003 [17]	F/80	Large cutaneous tumours with an ulcer formation on the trunk; clusters of small subcutaneous tumours on lower extremities	No	No	Dose-reduced CHOP therapy (cyclophosphamide, doxorubicin, vincristine, prednisolone)	Partial response; tumours subsided after dose escalation	8, progressive cutaneous tumours with ulcer formation	Salvage chemotherapy with local radiation	Partial response; Alive, 14
Okudaira 2009 [18]	M/54	Trunk and abdomen; asymptomatic subcutaneous tumours	No	No	CODOX-M chemotherapy (cyclophosphamide, doxorubicin, vincristine, methotrexate)	Complete disappearance of cutaneous lesions; complete remission	No	No	Alive, 24
Pang 2019 [19]	M/56	Superior extremities	No	No	R-CHOP (rituximab, cyclophosphamide, doxorubicin, vincristine, and prednisolone)	Complete response (CR)	10.5, relapse at the original sites; 16.5, relapse occurred again; 27, lesions progressed; 31, fleshy lesions re-appeared; 34, lesions recurred again	Lesions resolved with radiotherapy after the first relapse; lesions, treated with obinutuzumab and oral chlorambucil, remained stable after the second relapse; lesions treated with lenalidomide tend to subside after progression; thereafter, surgery was conducted and low-dose ibrutinib was continued	Remained in CR in the last follow-up; Alive, 67

Authors and year	Sex/age [years]	Location and symptom	Initial therapy			Evolution after initial therapy	Recurrence/ Metastasis/ Progression [months]	Therapies after recurrence/metastasis/ progression	Final evolution and survival [months]
			Surgery	Radiation	Chemotherapy				
Patsatsi 2013 [20]	M/76	Lower extremities; tender, erythematous, focally indurated plaques with irregular borders, with multiple violaceous nodules on the surface of the plaques	No	No	R-CHOP regimen with rituximab	Complete response	11.5, relapse occurred; 16.5, the second recurrence	Local radiotherapy with rituximab resulted in complete remission after relapse; local radiotherapy maintained with rituximab and achieved complete response again in the second recurrence	Alive, 24
Rozati 2016 [21]	F/67	Superior extremities; gyrated, and erythematous infiltrate	no	Local radiotherapy	no	Complete remission of the cutaneous tumour	Multiple local recurrences occurred on the left arm during the next 24 months; 48, multifocal CNS infiltrates	Systemic interferon α -2 α, radiotherapy, and intralesional adenovirus-mediated interferon γ gene delivery was conducted, resulting in transient complete remissions; total brain irradiation, intrathecal liposomal cytarabine, with rituximab plus cyclophosphamide, doxorubicin, vincristine, and prednisone (R-CHOP) were received when CNS infiltrates	Progressive leukoencep-halopathy; Dead, 48
Süss 2007 [22]	F/83	Lower extremities, foetid ulcer with elevated tumorous borders; corner of the eye, livid tumour	No	Yes	No	Complete clinical remission	No	No	Alive, 16
Testo 2016 [23]	M/54	Lower extremities; multiple infiltrative popular nodular skin lesions	No	Yes	R-CHOP (rituximab, cyclophosphamide, doxorubicin hydrochloride, vincristine sulfate, and prednisone)	Regression of all skin lesions	7, recurrence of lymphoma	RICE therapy (rituximab, ifosfamide, carboplatin, etoposide) with allopurinol and rituximab for maintenance chemotherapy	Widespread metastatic disease; Dead, 13
Wobser 2011 [24]	F/74	Lower extremities; growing nodules	No	No	Modified R-CHOP	Partial regression	16 months, localized disease progression at both legs	Fractionated, localized irradiation	Extensive lymphoma relapse Dead, 26
Wobser 2011 [24]	M/70	Lower extremities; asymptomatic, continuously growing nodules and plaques	No	Localized radiation	R-CHOP in 75% dose reduction	Disease-free for 4 months	Repeated cutaneous relapses at his legs	Being successfully treated with different regimens including radiation, rituximab or intensified treatment regimens containing polychemotherapy (R-DHAP, R-Gem/Ox, Dexa-BEAM)	Tumour-free, Alive, 30
Wobser 2011 [24]	M/46	Trunk	No	No	Modified R-CHOP with maintenance therapy with intravenous rituximab	Complete clinical and histological remission	No	No	Alive, 32
Torres-Paoli 2000 [25]	F/87	Lower extremities; painful nodules with partial ulceration	No	Yes	Systemic chemotherapy (CHOP)	Excellent response	No	No	Alive, 12

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Supplementary Table S2. Characteristics of patients affected by B-cell lymphoma after knee arthroplasty

Authors and year	Sex/age [years]	Medical history	Location and symptom	Radiograph	Diagnosis	Time after arthroplasty [years]	Therapy	Evolution	Survival [months]
Sunitsch 2016 [1]	F/80	Positivity for Hepatitis B Virus Core antibody	Peri-prosthetic membrane; Knee pain	Loosening of the prosthesis	Diffuse large B-cell lymphoma	11	(R-)-mini-CHOP chemotherapy and irradiation	No sign of recurrence	Alive, 8
Chaudhry 2011 [2]	M/76	Prostate adenocarcinoma	Knee; knee pain	Trabecular loss and rarefaction of the bone in the proximal medial tibia	DLBCL, germinal-centre phenotype	3	Radiotherapy + R-CHOP	Complete response	N/A
Sanchez-Gonzalez 2013 [3]	M/66	None	Knee, knee pain	Distal femur fracture and osteolysis in the periprosthetic area	Diffuse large B-cell lymphoma (DLBCL)	3	Radiotherapy and immunochemotherapy with rituximab, cyclophosphamide, doxorubicin, vincristine, and prednisone	Free of disease	Alive, 12
Entezari 2015 [4]	M/66	Coronary artery disease, cerebrovascular accident and advanced osteoarthritis	Knee aspiration; 3-month history of fevers and altered mental status; knee hardware was explanted and an antibiotic spacer applied 2 months ago due to clinical symptoms of prosthetic joint infection	Not mentioned	DLBCL, non-germinal centre B-cell phenotype	2	Rituximab, cyclophosphamide, doxorubicin and vincristine	Brain metastasis	N/A
Cheuk 2005 [5]	M/78	None	Knee pain	Mild osteolysis over the lateral femoral condyle	Large B-cell lymphoma	32	Radiotherapy	Well and mobile	Alive, 24
Ibrahim 2015 [6]	F/78	Hypertension and dyslipidaemia	Knee pain and swelling	Permeative destruction of the proximal part of the tibia surrounding the tibial component of the knee prosthesis	Diffuse large B-cell lymphoma, germinal-centre subtype	5	R-CHOP (rituximab, cyclophosphamide, doxorubicin, vincristine, prednisone) + radiation	Complete remission	Alive, 6
Agrawal 2019 [7]	F/74	Hypertension and bilateral knee osteoarthritis	Persistent left knee pain, swelling and reduced mobility; a lesion in the tibia	Not mentioned	Diffuse large B-cell lymphoma (DLBCL) , germinal centre subtype	0.5	Rituximab, cyclophosphamide, doxorubicin, vincristine and prednisone (R-CHOP) chemotherapy	N/A	N/A
Turner 2009 [8]	M/97	Atrial fibrillation, hypertension, transient ischemic attacks, and cataracts	Knee, large ulcer down to bone, with associated soft tissue necrosis and superimposed infection	None	Diffuse cutaneous large cell B cell lymphoma	21	Above knee amputation to clear the metal prosthesis	N/A	Died shortly after transferred to a hospice

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Supplementary Table S3. Summary of presentation, behaviour, and immunohistochemical pattern for various PCBCL subtypes

Histological type	Presentation	Behaviour	Immunohistochemical
PCMZL	Red-violaceous small solitary or multiple papules or nodules and rarely plaques	Indolent	CD20 +, CD79a +, BCL2 +, CD5–, CD10–, BCL 6–, MUM 1 –
PCFCL	Solitary or grouped erythematous or erythemato-violaceous papules, plaques, and/or nodules	Indolent	CD20+, CD79a+, CD5–, CD10+/–, BCL 6+, BCL2–, MUM–1/IRF–4 negative
PCDLBCL	Erythemato-cyanotic plaques and/or nodules with rapid growth	Aggressive	CD20+, CD79a+, BCL2+, CD10–, BCL 6+/–, FOX–P1 and MUM–1/IRF–4 positive
IVBCL	Violaceous patches and plaque, painful blue-red nodules, ulcerated tumours or telangiectatic skin lesions	Aggressive	CD20 +, BCL 2+, IRF4/MUM–1 + (MIB–1/Ki 67++)
EBV-MCU	Solitary, sharply demarcated ulcerating lesion	Indolent	Variable expression of CD20; CD19+, CD79a +, CD10–, CD30+, BCL2+, PAX 5+, BCL 6 –, MUM–1/IRF–4+

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Supplementary Table S4. Immunohistochemistry features of PCFCL with a diffuse growth pattern and PCDLBCL, LT

Immunohistochemistry	PCFCL, diffuse large cell	PCDLBCL, LT
B-cell lineage markers	CD20+, CD79a+, PAX5+, IgM-, IgD-	CD20+, CD79a+, PAX5+, IgM+, IgD+/-; monotypic light chain expression
Germinal centre markers	BCL6+, BCL2-, CD10-	BCL6+/-, BCL2+, CD10-
Postgerminal centre markers	IRF4/MUM1-, FOXP1-	IRF4/MUM1+, FOXP1+
MYC expression	Negative	Positive (65–80%)
Gene expression profile	GCB-type DLBCL	ABC-type DLBCL
Translocations BCL6, MYC, IgH	Absent	BCL6 (30%), MYC (35%), IgH (50%)
NF-κB pathway mutations	No MYD88 mutation	MYD88 (60%), CD79B (20%), CARD11(10%), TNFAIP3/A20 (40%)

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