

## Primary Appendix Lymphoma: Case Report and Review of the Literature

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### ABSTRACT

Appendectomy is the most frequent emergent surgical procedure in childhood. Carcinomas are the most frequent neoplasms in the appendix, other neoplasms such as carcinoid tumors and lymphomas may see less frequently. Primary tumors of the appendix are very rare. We report a patient presented with acute appendicitis diagnosed with B-cell lymphoma after pathological examination.

Keywords: Childhood lymphoma, B-cell lymphoma, appendix lymphoma

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## INTRODUCTION

Appendectomy is the most frequent emergency surgical procedure in childhood [1]. Pathological examination of the appendectomy specimens usually demonstrate diagnosis of acute appendicitis [2]. Appendiceal neoplasms may present with appendicitis [3]. Carcinomas are the most frequent neoplasms in the appendix, other neoplasms such as carcinoid tumors and lymphomas may seen less frequently [2]. Primary tumors of the appendix are very rare [4]. We report a patient presented with acute appendicitis is diagnosed with lymphoma after pathological observation. This is a rare form of non-Hodgkin's (NHL) lymphoma.

## Literature review

PubMed Central (US National Library of Medicine, 8600 Rockville Pike, Bethesda, Maryland, USA) and Google Scholar (Google Inc., 1600 Amphitheatre Parkway, Mountain View, California, USA) searches plus references of these articles revealed cases of appendicitis, lymphoma.

All cases were reviewed and patient details (age, sex, pathologic diagnosis, clinical appendicitis, surgical methods, and accompanying diseases) were noted, SPSS 16.0 was used for statistical analysis (mean value, standart deviation, minimum and maximum value).

## CASE REPORT

An 11-year-old boy was admitted to our clinic with the complaint of abdominal pain and nausea. Intermittent abdominal pain, which was aggravated in last day, was learned from the history. Physical examination revealed right lower quadrant tenderness and guarding. The patient had skin rash secondary to psoriasis on his lower extremities. In laboratory assessment, white blood cell count and C-reactive protein levels were 7900/  $\mu$ L (5000-11800  $\mu$ L) and 23.5 mg / L (0-8mg/L) respectively. Blood biochemistry parameters were in normal range. Abdominal X-ray demonstrated air-fluid levels in the right

lower quadrant and scoliosis. The patient was operated with the initial diagnosis of acute appendicitis. There were plenty of serous fluid in peritoneal cavity. The appendix and cecum were widely thickened (Figure 1). Appendectomy was performed. Postoperative serum level of LDH 324 IU/L (115-257 IU/L) was slightly higher than normal. Peripheral blood smear and bone marrow smear were normal. Postoperative course was uneventful. Oral feeding was started on the postoperative day. Pathological examination of appendix revealed centroblastic subtype of diffuse large B-cell lymphoma (Figure 2). The patient was discharged on the fifth postoperative day and he is on chemotherapy in the pediatric oncology department.



Figure 1. The Appendix was widely thickened.

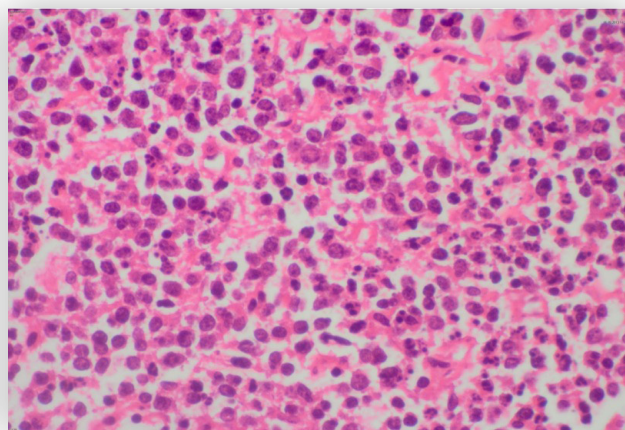


Figure 2. Diffuse large B-cell lymphoma. Centroblastic variant. The tumour cells have a polymorphic and polylobated appearance.

## Literature Review

There have been 169 cases of appendiceal lymphoma reported until 2015 (Table 1). These cases there were 76 adults, 34 children, and in 59 cases age group wasn't reported (Figure 3). Male to female ratio was 52/36, and in 81 cases sex wasn't reported. Mean age of adults was 47.03 + 19.15(18-84), mean age of children was 9.15 + 4.699 (3-17), and in 86 cases age wasn't reported. Sixty-one (36%) patients presented with right lower quadrant pain and underwent appendectomy. Other symptoms were abdominal mass, nausea, vomiting and weight loss.

B-cell lymphoma was the most common pathologic diagnosis (78%), followed by T-cell lymphoma (5%) and Hodgkin's disease (2%) respectively. The classification

was unspecified in 15% of cases and in 3 cases pathological diagnosis wasn't reported (Figure 4).

Appendectomy was the most common surgical method (81%), followed by right hemicolectomy (12%) and ileocecal resection (7%), respectively, and in sixty-three cases surgical methods were not reported (Figure 5).

Accompanying diseases was reported disseminated primary intestinal lymphoma [1], Acquired Immune Deficiency Syndrome [1], Primary nasal NK/T cell lymphoma [1], Crohn's Disease [1], posttransplant lymphoproliferative disorder [1], renal transplant [1], and chronic lymphocytic leukemia/Small lymphocytic lymphoma [1] (Table 1)

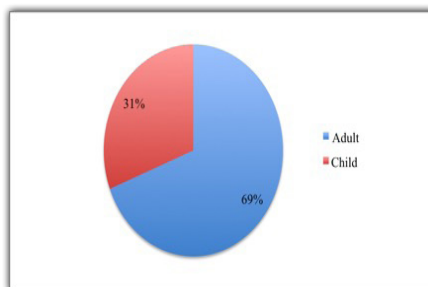


Figure 3. Age group according to appendiceal lymphoma

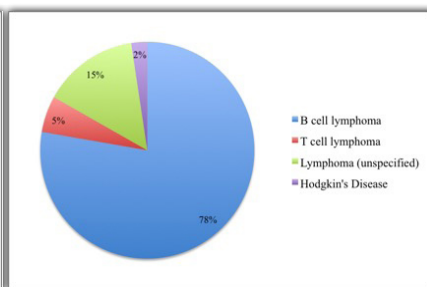


Figure 4. Pathologic distribution according to appendiceal lymphoma

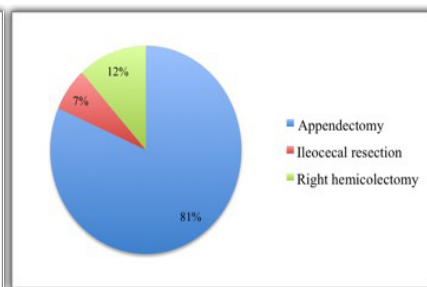


Figure 5. Surgical methods to appendiceal lymphoma

Table 1. Appendiceal lymphoma clinical data in the literature

	Age	Gender	Age group	Number of cases	Pathologic findings	Clinical Appendicitis	Operation	Survey	Accompanying diseases
Warren, 1898 (11)		M		1	Lymphoblastic sarcoma		Ileocaecotomy	>4 years	
Davis, 1900 (12)	51	M	Adult	1	Lymphoblastic sarcoma		Appendectomy	>5 months	
Paterson, 1903 (11)	39	M	Adult	1	Lymphoblastic sarcoma		Appendectomy	Postoperative died	
Bernays, 1905 (11)	29	F	Adult	1	Lymphoblastic sarcoma		Appendectomy	9 months, died	
DeJong, 1907 (11)		M		1	Lymphoblastic sarcoma		Appendectomy		
Carwardine, 1907 (13)	45	F	Adult	1	Lymphoblastic sarcoma		Appendectomy		
Wilhelm, 1919 (11)	17	M	Child	1	Lymphoma				
Powers, 1911 (11)	12	F	Child	1	Lymphoblastic sarcoma		Appendectomy	10 weeks, died	
Wright, 1911 (14)	17	M	Child	1	Lymphoblastic sarcoma		Right hemicolectomy	>3 years	
White, 1913 (11)	25	F	Adult	1	Lymphoblastic sarcoma		Appendectomy	>4 years	
Rohdenburg, 1919 (11)	4	M	Child	1	Lymphoblastic sarcoma		Caecotomy	>10 months	
Goldstein, 1921 (11)	25	F	Adult	1	Lymphoblastic sarcoma		Appendectomy		
Lehman, 1925 (11)	20	F	Adult	1					
Friend, 1926 (11)	9	F	Child	1	Lymphoblastic sarcoma		Appendectomy	Postoperative died	
Capecchi, 1927 (11)	8	M	Child	1	Lymphoblastic sarcoma		Appendectomy		
Stout, 1925 (11)	8 9	F	Child	2	Giant follicular lymphoma			Postoperative died	
Evans, 1932 (15)	55	M	Adult	1	Giant follicular lymphoma	1	Appendectomy	>3 years	
Ullman, 1932 (11)				2	Giant follicular lymphoma		Appendectomy		
Bizard, 1938 (11)	27	M	Adult	1	Lymphoblastic sarcoma		Appendectomy	>3.5 years	
Ruggieri, 1938 (11)	39	M	Adult	1	Giant follicular lymphoma				
Knox, 1945 (16)	4	M	Child	1	Lymphoblastic sarcoma		Appendectomy	>15 months	
Morhead, 1945 (11)	12 26 33	M M F	Child Adult Adult	3	Giant follicular lymphoma Giant follicular lymphoma Giant follicular lymphoma		Appendectomy Appendectomy Appendectomy		
McSwain, 1945 (11)	39 37	F F	Adult Adult	2	Giant follicular lymphoma Lymphosarcoma		Appendectomy Appendectomy	>2 years >4 years	
Galloway, 1949 (17)				1	Giant follicular lymphoma		Othopsy	Died	
Jason, 1949 (11)	34	F	Adult	1	Giant follicular lymphoma		Appendectomy		
Clarke, 1950 (11)	32	M	Adult	1	Lymphosarcoma		No resection	1 month, died	
Henley, 1954 (11)	38	M	Adult	1	Diffuse large cell lymphoma		Appendectomy	>3 years	
Rosenberg, 1961 (6)			-	13	Lymphosarcoma	1			

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Collins, 1963 (6)			-	11	Lymphosarcoma				
Dorfman, 1965 (6)			-	3	Burkitt's lymphoma				
Glick, 1966 (11)	4	M	Child	1	Diffuse large cell lymphoma		Right hemicolecotomy	>12 years	
Jenkin, 1969 (18)			Child	8	Lymphoma	6			
Loehr, 1969 (19)		F	Adult	2	Lymphoma		Appendectomy	>9 years	
Lewin, 1978 (20)	15		Child	1	Lymphoma	1	Appendectomy	>4 years	
Contreary, 1980 (21)			Adult	3	Giant follicular Lymphoma (1); 2x?				
Franchini, 1979 (6)	25	F	Adult	1	Stem cell				
Nanji, 1983 (22)	22	M	Adult	1	Undifferentiated Burkitt's type	1	Appendectomy		
Schmutzer, 1975 (23)			Adult	3	Lymphoma		Appendectomy		
Sin, 1980 (24)	8 10	M M	Child Child	2	Burkitt's lymphoma		Appendectomy	>3 years >18 months	
Saitou, 1981 (11)	20	F	Adult	1	Lymphoma		Right hemicolecotomy	7 months, died	
Murakuni, 1982 (11)				1	Diffuse large cell lymphoma		Right hemicolecotomy		
Ghani, 1984 (6)		M	Adult	1	Burkitt's lymphoma	1			
Swerdlow, 1984 (6)	34	F	Adult	1	Caribbean T cell lymphoma				
Mori, 1985 (7)	70	F	Adult	1	Lymphoma, small lymphocytic		Ileocecal resection with mesenteric lymph node dissection	>3 years	
Back, 1986 (25)	57	M	Adult	1	Unclassified high grade lymphoma	1	Appendectomy	>40 months	
Stewart, 1986 (26)	33	F	Adult	1	B cell lymphoma	1	Appendectomy	>18 months	
Chan, 1987 (27)				2	Lymphoma	2	Appendectomy		Disseminate primary intestinal lymphoma
Chawla, 1990 (6)	34	F	Adult	1	Poorly differentiated lymphocytic lymphoma				
Shimada, 1990 (28)	48	M	Adult	1	Diffuse large cell lymphoma, B cell type		Ileocecal resection		
Carpenter, 1991 (29)	65	M	Adult	1	Diffuse infiltration of small cell lymphoma		Right hemicolecotomy with paraaortic lymph node resection		
Caine, 1990 (6)	3	F	Child	1	Burkitt's lymphoma	1			

Stovroff, 1991 (30)			Child	4	Burkitt's lymphoma	1	Appendectomy(3) Right hemicolecotomy(1)		
Carsetensen, 1993(6)	17	M	Child	1	Burkitt's lymphoma	1			
Rao, 1991 (6)	75	M	Adult	1	Lymphoblastic lymphoma				
DiSario, 1994 (31)			Adult	1	Lymphoma				
Ranaldi, 1994 (6)	71	M	Adult	1	Centrocyte-like				
Pasquale, 1994 (11)	77	M	Adult	1	Lymphocytic lymphoma		Appendectomy	>5 months	
Müller, 1997 (6)	74 24 69	M F M	Adult	3	Low grade B-cell lymphoma Anaplastic large T-cell lymphoma Diffuse large B-cell lymphoma	3	Right hemicolecotomy Appendectomy Appendectomy	>6 months >2 years -	
Connor, 1998 (32)			-	1	Lymphoma		Appendectomy		
Uncu, 1998 (33)	29	M	Adult	1	Lymphoma	1	Appendectomy with mesenteric lymph node dissection	>1 year	
Malicki, 1999 (34)	32	M	Adult	1	Angiotropic large T-cell lymphoma		Appendectomy	>14 months	AIDS
Tsujimura, 2000 (35)	20	M	Adult	1	NK/T-cell lymphoma		Appendectomy		Primary Nasal NK/T cell lymphoma
Kitamura, 2000 (36)	84	F	Adult	1	T cell lymphoma	1	Appendectomy	>22 months	
Pickhardt, 2002 (37)	54 (mean)	M(4), F(1)	Adult	5	Mantle cell lymphoma (2) Diffuse large B-cell lymphoma (3)	5	Appendectomy (4) Right hemicolecotomy (1)		
Duzgun, 2004 (38)			Adult	1	B cell lymphoma	1	Appendectomy		
Fu, 2004 (39)	42	F	Adult	1	Diffuse large cell lymphoma, B-cell type	1	Appendectomy		
Shiwani, 2006 (40)	56	M	Adult	1	Centrocytic type small cell lymphoma	1	Appendectomy	>3 years	
O'Donnell, 2007 (36)	15 78 70	F M M	Child, Adult	3	Non-Hodgkin Lymphoma		Appendectomy		
Souza, 2008 (41)	53	M	Adult	1	B cell lymphoma				
Umer, 2008 (42)	65	M	Adult	1	Hodgkin's disease		Right hemicolecotomy	>10 months	Crohn's disease
Khanna, 2008 (43)	49	M	Adult	1	Burkitt's lymphoma	1	Right hemicolecotomy	>10 months	

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Medlicott, 2008 (44)	53	F	Adult	1	Diffuse large cell lymphoma, B-cell type	1	Appendectomy		Posttransplant lymphoproliferative disorder
Radha, 2008 (45)	61	M	Adult	1	B-cell lymphoma		Ileocecal resection		
Marte, 2008 (46)	6	F	Child	1	Mucosa-associated lymphoid tissue lymphoma	1	Appendectomy	>15 months	
Gustafsson, 2008 (4)			-	12	Diffuse large cell lymphoma, B-cell type (11), Hodgkin's disease (1)				
Toyomasu, 2009 (47)	74	F	Adult	1	Mucosa-associated lymphoid tissue lymphoma	1	Ileocecal resection		
Weine, 2009 (48)	76	M	Adult	1	Hodgkin's Disease	1	Appendectomy		
Ghasmei, 2010 (49)	22	M	Adult	1	Diffuse large cell lymphoma, B-cell type	1	Appendectomy	>2 years	
Miyazaki, 2010 (50)	60	F	Adult	1	Mucosa-associated lymphoid tissue lymphoma	1	Right hemicolectomy with partial resection of the right ureter	>2 years	
Abdalla, 2010 (51)	49	M	Adult	1	Burkitt's lymphoma	1	Appendectomy	> 1 month	
Bhardwaj, 2010 (52)	14	M	Child	1	Burkitt's lymphoma	1	Right hemicolectomy		
Baek, 2011 (53)	37	M	Adult	1	Diffuse large cell lymphoma, B-cell type	1	Appendectomy		
Akbulut, 2011 (54)			Child, Adult	14	B-cell lymphoma (12) T-cell lymphoma (2)	14	Appendectomy		
Ratuapli, 2011 (55)	45	M	Adult	1	Large T cell lymphoma	1	Appendectomy		Renal transplant
Quigley, 2012 (56)	64	F	Adult	1	Small lymphocytic lymphoma and Hodgkin transformation	1	Appendectomy		Chronic lymphocytic leukemia / Small lymphocytic lymphoma
Linden, 2012 (2)	71	M	Adult	1	Mantle cell lymphoma	1	Appendectomy		
Matsushita, 2013(57)	7	M	Child	1	T-cell lymphoma	1	Appendectomy	>2 years	
Yilmaz, 2013 (58)			Adult	1	B-cell lymphoma		Appendectomy		
Weledji, 2014 (59)	13 18	F F	Child, Adult	2	Burkitt's lymphoma	2	Appendectomy Ileocecal resection	>8 years >9 years	
Sun, 2014 (60)			Adult	1	T-cell lymphoma				

Ghosal, 2014 (61)	3		Child	1	Hodgkin's disease	1	Abdominal lymph node biopsy		
Guo, 2015 (62)	43	F	Adult	1	Diffuse large cell lymphoma, B-cell type	1	Appendectomy		
Chae, 2015 (63)	75	M	Adult	1	Mantle cell lymphoma	1	Appendectomy		

## DISCUSSION

Lymphoma often causes gastrointestinal involvement. Clinical presentation shows great variation. Diarrhea, weight loss, and intussusception are the most common signs and symptoms [5]. Lymphomatous infiltration of the appendix and lymphoma associated with acute appendicitis is very rare. Primary appendicular lymphoma is diagnosed earlier than other gastrointestinal lymphomas as it gives rise symptoms earlier in the disease and an early stage [6]. Abdominal X-ray is generally nonspecific. Ultrasonography reveals abdominal mass, enlarged lymph nodes, and ascites. Abdominal computerized tomography scanning should be performed with oral and intravenous contrast agent. Thus, a characteristic appearance of contrast-filled loops of bowel, trapped and encased by large soft tissue masses is seen. 'Omental cakes' sign is shown by CT. However, abdominal X-ray and US imaging are preferred more often than CT in the setting of acute abdominal pain and other gastrointestinal symptoms [5]. Computed tomography is preferred less often because of the risk of radiation. Therefore, preoperative diagnosis is rare. Mori et al. described correct diagnosis in 19 of 39 cases. Many of these patients presented with acute abdomen [7].

Gastrointestinal system lymphomas can occur four parts; lymphoid tissue, the lamina propria, intraepithelial lymphocytes, and mesenteric lymph nodes [4]. The incidence of small intestine and colon lymphomas is 0.22 to 0.35 and 0.1 to 0.21, respectively. Lymphomas of the appendix were rare showing 1.7% of all appendix tumors [4]. Small intestine lymphomas are frequently of diffuse large B-cell type. Burkitt lymphoma is a rare. It frequently occurs in the ileo-cecal region. Appendiceal B cell lymphoma was analyzed Burkitt's lymphoma rate %13 in this study. The most common presentation of ileo-cecal region lymphoma is abdominal pain. On the other hand, according to this study, only 36% of cases

presented with classical clinical signs and symptoms of appendicitis. Appendiceal lymphoma rarely presents with palpable abdominal mass [8].

Colon lymphoma include 10% of all lymphomas and Generally occur in the cecum [9]. Colonic lymphomas are frequently of diffuse large B-cell type. The most common presentations are abdominal pain. Colon lymphoma is usually seen in the elderly and associated with inflammatory bowel disease, HIV/AIDS and immunosuppressive treatment [10]. In this study, which examined the appendix lymphoma cases, there was only one case of AIDS and three cases were on immunosuppressive agents. Also, our patient had psoriasis. Psoriasis is a chronic inflammatory disease and it might be at increased risk of cancer due to chronic inflammation and immunosuppressive drugs. A study that is systematic literature review showed that the risk of non-Hodgkin lymphoma appears to be slightly increased in psoriasis.

The T-cell lymphoma is extremely rare. It is associated with immune compromised conditions. The gastrointestinal tract is the most common site for extranodal involvement of non-Hodgkin's lymphoma; appendiceal lymphoma is exceedingly rare [11]. Hodgkin's diseases, was found 2% in appendix lymphomas (Figure 4).

In literature, the most common surgical method is appendectomy (Figure 5). On the other hand, extensive excision may be needed. What should be the surgical method for appendiceal malignancies? Our recommendation is not to make a wide excision without a pathological diagnosis.

## CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest in this study.



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