



Diagnosing a hematopoietic malignancy during shoulder arthroplasty

Dijagnostikovanje hematopoetskog maligniteta tokom artroplastike ramena

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Abstract

Introduction. Determining the cause of shoulder pain is usually a challenge as many problems, such as rheumatoid arthritis, osteoarthritis, osteonecrosis, rotator cuff arthropathy, traumatic arthritis, fractures, conditions of cervical vertebra, and neoplasms, can produce similar symptoms. The diagnosis is usually regarded as incidental, however, chronic lymphocytic leukemia (CLL) diagnosis by the histopathological evaluation performed on lymph nodes excised during a shoulder procedure has not been reported in the literature, to the best of our knowledge. We present a CLL-small lymphocytic lymphoma (SLL) case diagnosed incidentally during reverse shoulder arthroplasty. **Case report.** A 69-year-old female with a history of left proximal humerus fracture a year prior was presented to our outpatient clinic with left shoulder pain. A proximal humerus non-union was revealed radiographically. The patient underwent reverse

shoulder arthroplasty. During surgery, a $2.5 \times 1.5 \times 1$ cm sized lymph node was observed near the left cephalic vein. The lymph node biopsy result was reported to be CLL-SLL. The patient had no early postoperative complications and was discharged two days after. At her final evaluation, she was free of orthopedic complaints and was consulted with the hematology department to receive CLL-SLL treatment. **Conclusion.** Elderly patients presenting with non-union should be questioned for vague symptoms; lymph nodes surrounding the non-union site should be examined thoroughly. Any suspicious lymphadenopathy encountered during orthopedic surgery should be excised and sent for pathological evaluation.

Key words:
diagnosis; fractures, bone; histological techniques; humerus; leukemia, lymphocytic, chronic, b-cell; lymph nodes; orthopedic procedures.

Apstrakt

Uvod. Utvrđivanje uzroka bola u ramenu predstavlja izazov zbog mnogih oboljenja i stanja koja mogu izazvati slične simptome (reumatoidni artritis, osteoartritis, osteonekroza, artropatija rotatorne manžetne, traumatski artritis, prelomi, različita stanja vratne kičme i neoplazme). Dijagnoza se obično postavlja slučajno, međutim, u literaturi do sada, po našem saznanju, nije objavljen slučaj postavljene dijagnoze hronične limfocitne leukemije (HLL) na osnovu histopatološke procene limfnih čvorova uklonjenih tokom operacije ramena. Prikazujemo slučaj HLL-limfoma malih limfocita (LML) koji je slučajno otkriven tokom reverzne artroplastike ramena. **Prikaz bolesnika.** Bolesnica, stara 69 godina, javila se na pregled na ortopedsku kliniku zbog bola u levom ramenu, sa podatkom o prelomu proksimalnog humerusa prethodne godine. Radiografski je ustanovljeno nesrastanje proksimalnog humerusa i

urađena je artroplastika ramena. Tokom operacije u blizini leve cefalične vene je uočen limfni čvor veličine $2,5 \times 1,5 \times 1$ cm čijom biopsijom je utvđena HLL-MLL. Bolesnica nije imala rane postoperativne komplikacije i otpuštena je posle dva dana. Na završnoj proceni zaključeno je da je bez ortopedskih tegoba i upućena je na hematološku kliniku radi daljeg lečenja HLL-MLL. **Zaključak.** Ukoliko imaju nejasne simptome, treba pažljivo ispitati starije bolesnike, kod kojih nije došlo do zarastanja preloma. Limfne čvorove oko mesta koje nije zaraslo treba pažljivo ispitati i svaki sumnjivi limfni čvor zapažen tokom ortopedske hirurgije treba odstraniti i uputiti patologu na analizu.

Ključne reči:
dijagnoza; prelomi; histološke tehnike; humerus; leukemija, b-ćelije, hronična; limfne žlezde; ortopedske procedure.

Introduction

Determining the cause of shoulder pain is usually a challenge as many problems, such as rheumatoid arthritis, osteoarthritis, osteonecrosis, rotator cuff arthropathy, traumatic arthritis, fractures, conditions of cervical vertebra, and neoplasms, can produce similar symptoms¹. A reverse shoulder arthroplasty is a popular option in massive irreparable rotator cuff tears, multi-fragmented proximal humerus fractures, and revision shoulder arthroplasty². The preferred approach for shoulder arthroplasty is usually deltopectoral, which involves visualization of the cephalic vein³. The cephalic vein's anatomic course is known to be in close relation with the lymphatic system, and the shoulder region is rich in lymph nodes^{4, 5}. Chronic lymphocytic leukemia (CLL) is the most common leukemia type, and patients are usually asymptomatic upon admission. Increased white blood cell count and lymphocyte count are usually the findings that lead to the diagnosis. Fever of unknown origin, weight loss, and palpable lymph nodes are less common clinical findings in CLL⁶.

The diagnosis is usually regarded as incidental, however, CLL diagnosis by the histopathological evaluation performed on lymph nodes excised during a shoulder procedure has not been reported in the literature, to the best of our knowledge. We present a CLL–small lymphocytic lymphoma (SLL) case diagnosed incidentally during reverse shoulder arthroplasty.

Case report

The case review was conducted according to all guidelines outlined in the Declaration of Helsinki. Written informed consent for publication was obtained from the patient's nearest relative.

A 69-year-old female with a history of type 2 diabetes mellitus, hypertension, and congestive cardiac failure was presented to our outpatient clinic with left shoulder pain. Left proximal humerus fracture was diagnosed a year prior, and an ongoing limited range of motion was noticed. After the radiographic evaluation, a proximal humerus non-union was revealed (Figure 1A). Reverse shoulder arthroplasty was opted as a treatment strategy by evaluating the status of the joint and functional expectations of the patient. In preoperative evaluation, there were no fever, cough, or other symptoms that could be relatable to a chronic inflammatory condition. Routine preoperative bloodwork was unremarkable.

The patient underwent reverse shoulder arthroplasty with a deltopectoral approach in a beach-chair position. During surgery, a $2.5 \times 1.5 \times 1$ cm sized lymph node with an irregular surface and off-white color was observed near the left cephalic vein (Figure 2). The lymph node was excised and sent for pathologic evaluation. Surgery was carried on with no complications (Figure 1B). The patient had no early postoperative complications and was discharged two days after.

In the histopathological examination of the excisional lymph node biopsy, there were a diffuse infiltration and effacement of normal lymph node architecture with small-medium sized lymphocytes with scant cytoplasm, clumped chromatin, and indistinct or absent nucleoli, which are representative of prolymphocytes and paraimmunoblasts. Immunohistochemical stainings revealed the B lymphocytic infiltration with diffuse CD20 positivity. These cells showed CD5 and LEF-1 coexpressions and cyclin D1 and SOX11 negativity. CD23 was positive in dendritic cells of residue lymphoid follicles. CD3 staining was observed in residue T-lymphocytes. The lymph node biopsy result was reported to be CLL-SLL (Figure 3). The patient was free of

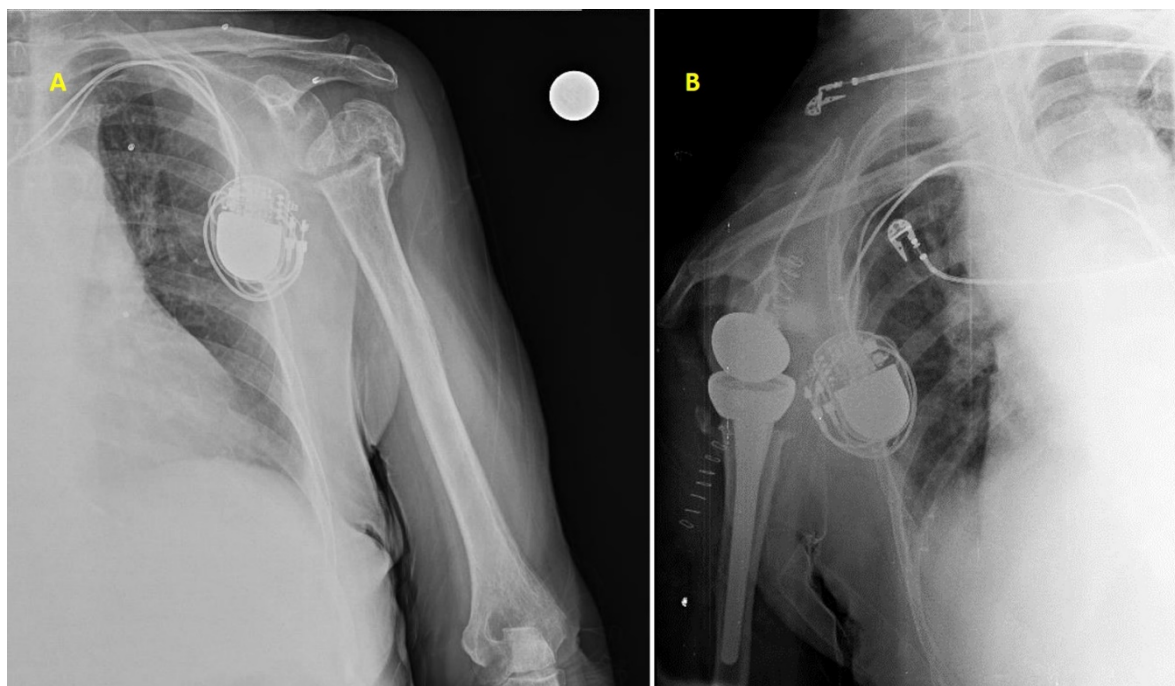


Fig. 1 – A) Patient on admission had non-union at proximal humerus; B) Postoperative radiograph after reverse shoulder arthroplasty is shown.

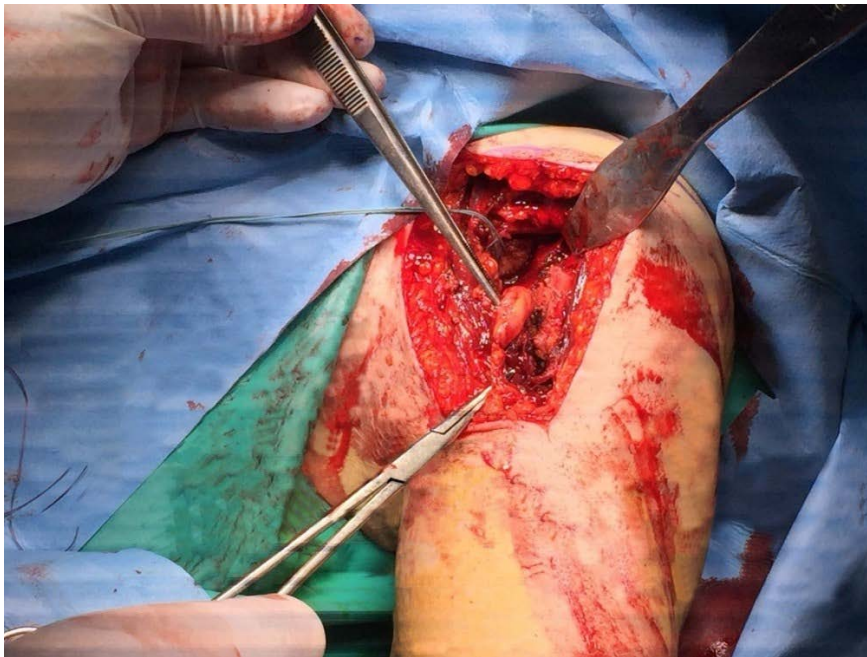


Fig. 2 –Intraoperatively, a $2.5 \times 1.5 \times 1$ cm sized lymph node with an irregular surface and off-white color was observed near the left cephalic vein.

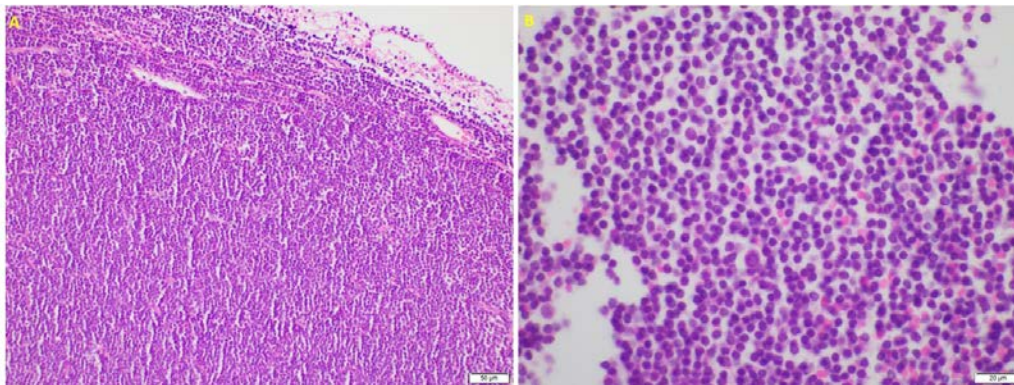


Fig. 3 – Hematoxylin and eosin stained diffuse, small polymorphocytes: **A)** magnification 40 \times ; **B)** magnification 100 \times .

orthopedic complaints at her final evaluation and was consulted with the hematology department to receive CLL-SLL treatment. In the follow-up performed in the hematology department, two 1×1.5 cm eraser-like lymphadenopathies (LAP) in the right anterior cervical chain, 1×1 cm LAP in the left posterior cervical chain, two 1×1 cm LAP in the right axillary region, and 1.5 cm LAP in both inguinal areas were detected. No hepatosplenomegaly was detected during the follow-up.

Discussion

The most affected group in CLL is the geriatric population⁷. Diagnosis of CLL is usually incidental as it lies dormant for long periods of time. The identification of incidental lymphocytosis or lymphadenopathy, seen in 50% to 90% of patients, is the most common clue for diagnosis. However, in the reported case, we have not palpated

lymphadenomegaly or spotted lymphocytosis upon admission to the orthopedic outpatient clinic. Diagnosis relied on incidental lymph node biopsy performed after clinical suspicion. Some authors argue that malignancies may interfere with fracture healing and should be regarded as a factor of bone destruction thus, non-union in the presented case may be due to malignancy itself⁸.

There are reports of incidental CLL diagnosis from lymph node biopsies during pelvic and abdominal procedures such as: radical prostatectomy^{9, 10}, in which the rate of incidental diagnosis has been reported to be 0.3%¹; splenic rupture⁷; chronic cholecystitis¹¹. Incidental biopsies resulting in CLL diagnosis have also been reported in tissue samples from the lungs, oral cavity, and orbital sinus¹²⁻¹⁴. Extremity involvement is exceedingly rare, where reported cases were diagnosed with biopsies following pathologic fractures of the proximal femur and radius¹⁵. In rare cases, patients present with shoulder pain can have underlying

lymphoma. However, almost all reported patients were diagnosed with non-Hodgkin lymphoma^{5,16}.

Conclusion

Several conclusions can be drawn by an orthopedic surgeon from this report. Firstly, elderly patients presenting with non-union should be questioned for B symptoms such as fever, night sweats, and weight loss. These symptoms are usually vague and could be easily missed by even experienced surgeons. Secondly, lymph nodes surrounding the non-union site should be examined thoroughly. Finally,

despite extremity involvement being exceedingly rare, any suspicious LAP encountered during orthopedic surgery should be excised and sent for pathological evaluation. A strong collaboration with the pathologist is necessary to increase the accuracy of diagnosis. Careful management following the identification of a pathologic lymph node during dissection may lead to an early diagnosis and directly affect ultimate survival.

Conflicts of interest

The authors report no conflict of interest.

R E F E R E N C E S

1. Weir EG, Epstein JI. Incidental small lymphocytic lymphoma/chronic lymphocytic leukemia in pelvic lymph nodes excised at radical prostatectomy. *Arch Pathol Lab Med* 2003; 127(5): 567–72.
2. Lee DH, Choi YS, Potter HG, Endo Y, Sivakumaran T, Lim TK, Chun TJ. Reverse total shoulder arthroplasty: an imaging overview. *Skeletal Radiol* 2020; 49(1): 19–30.
3. Radkowski CA, Richards RS, Pietrobon R, Moorman CT 3rd. An anatomic study of the cephalic vein in the deltopectoral shoulder approach. *Clin Orthop Relat Res* 2006; 442: 139–42.
4. Morföisse F, Noel A. Lymphatic and blood systems: Identical or fraternal twins? *Int J Biochem Cell Biol* 2019; 114: 105562.
5. Caporale MF, Gambino GF, Larosa FS, Del Buono A, Di Segni F. Non-Hodgkin's lymphoma: unexpected cause of shoulder pain. A systematic review of the literature. *Muscles Ligaments Tendons J* 2013; 3(3): 236–9.
6. Nabhan C, Rosen ST. Chronic lymphocytic leukemia: a clinical review. *JAMA* 2014; 312(21): 2265–76.
7. Oviedo RJ, Glickman AA. Emergency splenectomy for trauma in the setting of splenomegaly, axillary lymphadenopathy, and incidental B-cell chronic lymphocytic leukemia: A case report. *Int J Surg Case Rep* 2017; 37: 161–4.
8. Tanrıkuş S, Gönen E. Kemik iyileşmesi. *TOTBİD Dergisi* 2017; 16(6): 455–75. (Turkish)
9. He H, Cheng L, Weiss LM, Chu PG. Clinical outcome of incidental pelvic node malignant B-cell lymphomas discovered at the time of radical prostatectomy. *Leuk Lymphoma* 2007; 48(10): 1976–80.
10. Chu PG, Huang Q, Weiss LM. Incidental and concurrent malignant lymphomas discovered at the time of prostatectomy and prostate biopsy: a study of 29 cases. *Am J Surg Pathol* 2005; 29(5): 693–9.
11. Imenpour H, Castagnola M, De Silva G, Zupo S, Truini M, Merlo E, et al. Incidental finding of peripheral B-cell non-Hodgkin lymphoma, lymphocytic/CLL type, of the gallbladder in a patient with chronic cholecystitis. *Pathologica* 2011; 103(5): 307–10.
12. Rollins SD, Colby TV. Lung biopsy in chronic lymphocytic leukemia. *Arch Pathol Lab Med* 1988; 112(6): 607–11.
13. Peters SM, Han C, Yoon AJ, Philpott EM. Chronic lymphocytic leukemia in association with a ranula: a report and review of the literature. *Oral Surg Oral Med Oral Pathol Oral Radiol* 2017; 123(5): e160–3.
14. Lim KH, Thomas G, van Beers EJ, Hosman AE, Mourits MP, van Noesel CJ, et al. Acute sinusitis and blindness as the first presentation of chronic lymphocytic leukaemia. *Neth J Med* 2014; 72(10): 548–50.
15. Zafeiris T, Gothner M, Hempel Overhage C, Heil G, Roetman B. Acute exacerbation of chronic CLL with multiple pathological fractures: A rarity. *Unfallchirurg* 2018; 121(11): 930–4. (German)
16. Arredondo J, Worland RL, Sinnenberg RJ Jr, Qureshi GD. Non-Hodgkin's lymphoma as an unexpected diagnosis in a shoulder arthroplasty. *J Arthroplasty* 1999; 14(1): 108–11.

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