Multiple Deep Neck Abscesses Developed in a Case of Acute Myeloid Leukemia, Proposed as a Chemotherapy Related Complication, A Case Report

Daniel Chai Z.C., Nur Izzati Ishak., Eugene Wong H.C

Otorhinolaryngology Department, Faculty of Medicine and Health Sciences, Universiti Malaysia Sabah

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ABSTRACT

We are describing a peculiar case of multiple deep neck abscesses developed in a young 25 years old lady, who is a case of newly diagnosed Acute Myeloid Leukemia (AML) post completion of Daunorubicin chemotherapy regime. The subject had initial bilateral neck swelling which worsened, whereby serial follow up radiological investigation demonstrated multiple deep neck collections. Abscesses were drained surgically, particularly one which is located in the nasopharynx is visually described. The main bulk of this article is dedicated to explore and link various factors which may contribute to the transformation of tumorous lymph nodes into full blown abscesses.

INTRODUCTION

Deep neck abscess is a condition whereby pus is accumulated in potential spaces and fascia planes in the neck deep to the investing fascial layer, it is a condition with high rate of mortality and morbidity, though rarely associated with chemotherapy, the link has previously been reported [8]. Immunodeficient populations has been known to have higher propensity for abscess formation, due to the inadequacy of immune response to contain an infection, therefore in the case of infection in the neck region, they tend to become more widespread, often extend beyond a particular deep neck space, hence, as compared to more common cases of neck abscess seen in paediatrics resulting from suppurative process of lymph nodes, deep neck abscesses in adult tend to be multispace, which increases the rate of complication [3][4].

The mainstay treatment for deep neck abscesses in adults should be surgical drainage in concurrent with empirical IV antibiotic therapy, Surgical drainage techniques however is not always straightforward, particularly abscesses involving retropharyngeal, parapharyngeal, parotid, peritonsillar and submucosal spaces, therefore surgical approach towards draining an abscess often individualized and tailored for each patient, correlating to a surgeon's preferences, skill and experience. As for justification of empirical antibiotics, most evidence was derived from readily available clinical and microbiological data, such as Brito et al 2017, a retrospective study, which will be discussed further in the discussion section [1].

Case

A 25 years old nulliparous lady with underlying chronic tonsillitis, referred by Emergency Service Department to Otorhinolaryngology (ORL) team with a history of acute onset bilateral neck swelling, swinging fever, sore throat and general weakness for 2 weeks duration, symptoms of which did not improve with a course of oral antibiotic from a general practitioner. A further history of palpitation, reduced effort tolerance and persistent lightheadedness from systematic review hinted a concurrent anemic state. On general inspection the patient appeared pale and lethargic, neck examination revealed tender and multiple enlarged lymph nodes bilaterally, on the right side noted at level II largest node measuring 6x3cm and on the left noted at level II with largest node measuring 3x3cm. Full blood count investigation at the emergency unit noted severe anemia with hemoglobin level of 3.4 g/dL (normal range 12.1 - 15.1g/dL), alongside significant leukocytosis 167.2 x 10^9/L (normal range 4.0 - 10.0 x 10^9/L). With neck abscess in mind as working diagnosis, first contrasted Computed Tomography (CT) neck was done, however no typical rim enhancing hypodense collections noted, instead, it showed bilateral

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neck lymphadenopathy with multiple foci of intranodal necrosis. The patient was further managed under the Hematology unit, pack cells transfusion was given in an attempt to elevate the immediate hemoglobin level, while pre-transfusion peripheral blood film samples found blast cells which confirmed leukemia diagnosis. As part of mandatory further workup, immunophenotyping of peripheral blood & Bone marrow aspiration samples noted AML while cytogenetic study pins FLT3-ITD mutation as pathogenetic factor. IV Cytarabine and IV Daunorubicin "7+3" Chemotherapy regime given alongside IV Cefuroxime as empirical Antimicrobial coverage.

The patient was subsequently referred back to the ORL team by the Hematology Unit due to worsening of neck swelling having completed 10 days Chemotherapy and total 4 weeks of uninterrupted antibiotic therapy, reassessment by attending ORL surgeon noted fluctuant swelling over bilateral neck, with overlying skin erythema where frank pus can be aspirated, a bedside flexible nasoendoscopy noted fullness over left nasopharyngeal wall, particularly inferior to the left torus tubarius. A repeated Contrast enhanced CT neck (4 weeks apart after the first one) noted enlarged hypodense necrotic center of lymph nodes compared to previous scan indicative of abscess formation and a new foci of hypodense collection in the left nasopharynx. Fig 1 - 4 shows progression of the initial acute lymphadenitis to suppurative lymphadenitis and neck abscess, demonstrated by CT scan of the neck.

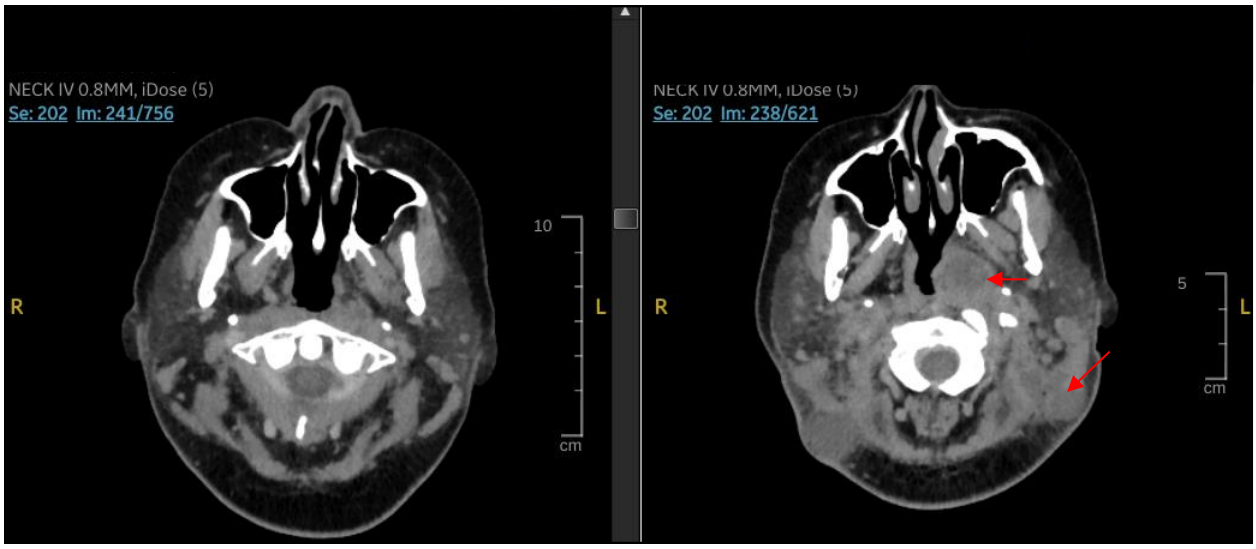

Fig1. Axial view CT neck at the level of nasopharynx, hypodense collection in the left lateral nasopharyngeal wall in close proximity to the left eustachian (right), a finding which was absent in the earlier scan (left)

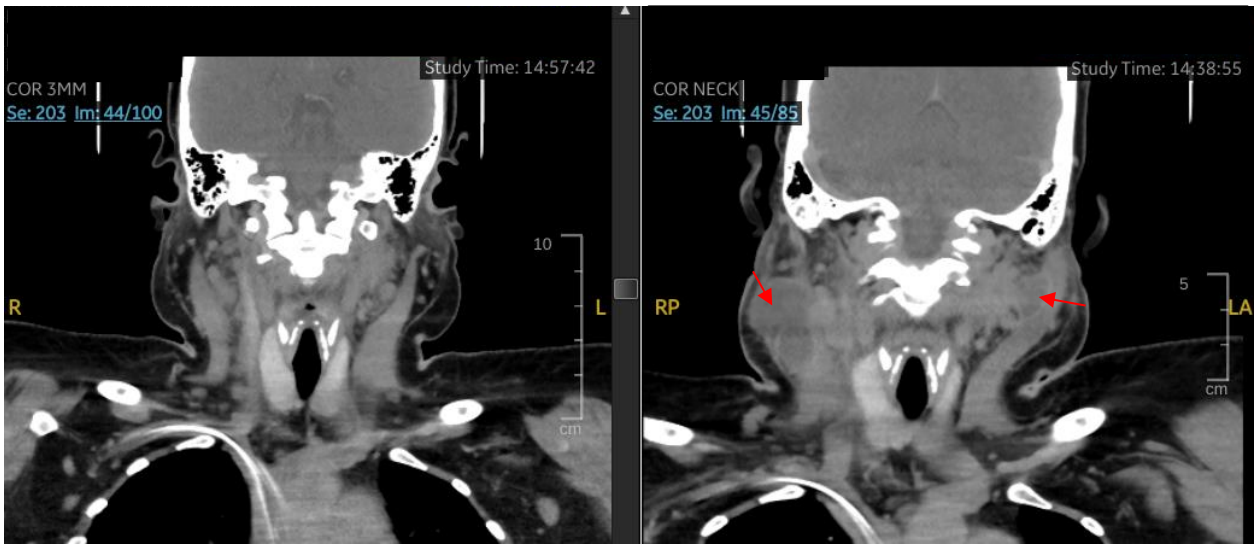

Fig2. Coronal view CT neck, previously inflamed cervical lymph nodes (left), progressed into suppurative nodes and deep neck abscess (right)

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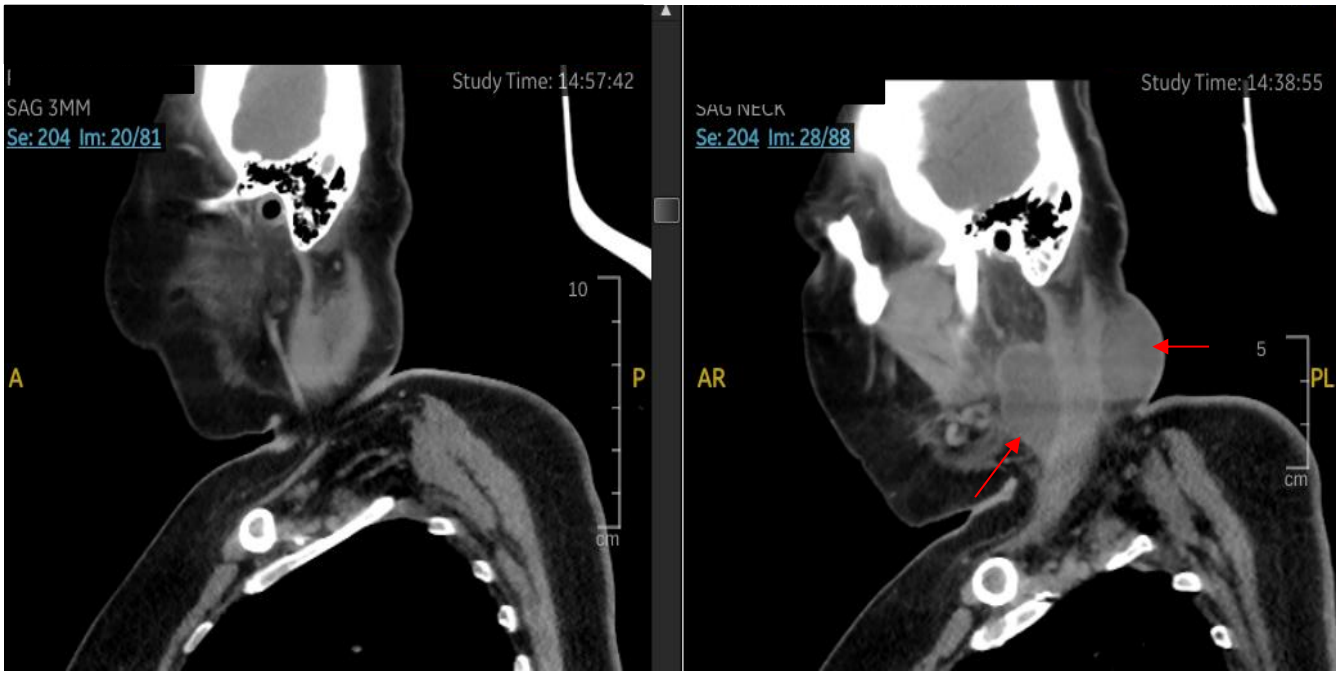

Fig3. Sagittal view CT neck, previously inflamed cervical lymph nodes (left), progressed into suppurative nodes and deep neck abscess (right)

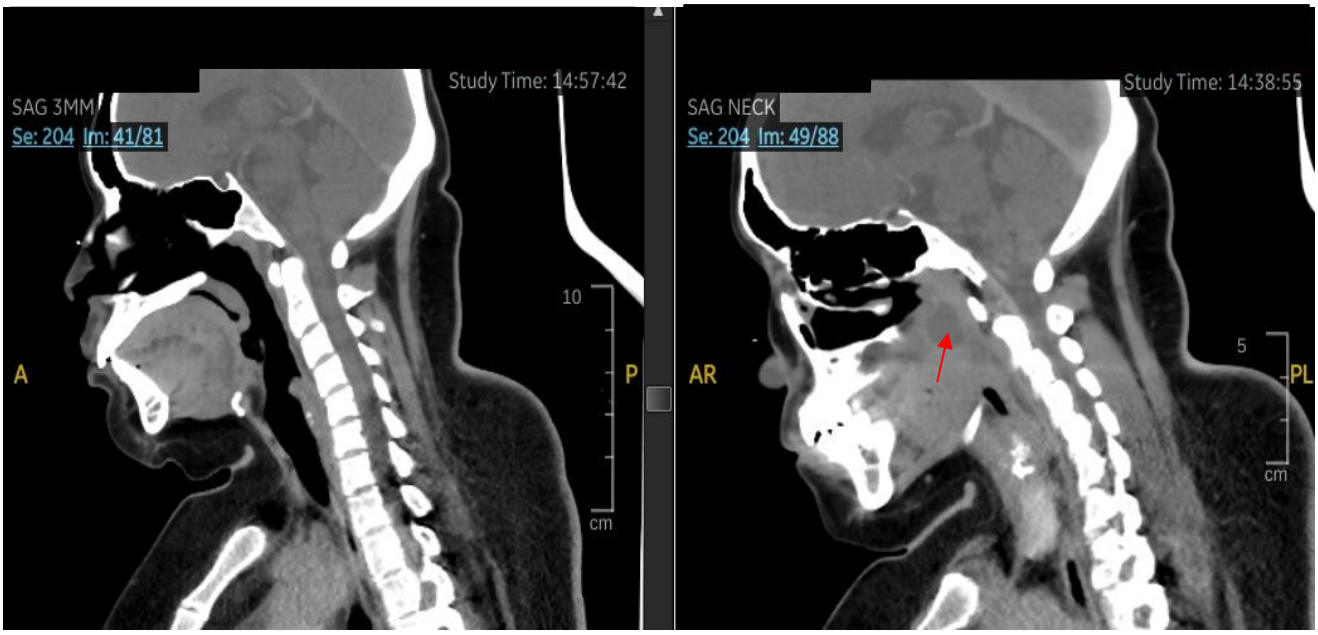

Fig4. Sagittal view CT neck, film on the right shows abscess in the left lateral nasopharyngeal wall which tracts down the submucosally with associated mucosal edema and loss of lordosis of the cervical spine suggestive of prevertebral muscle spasm, features which are absent in earlier film (left)

Under general anaesthesia, bilateral neck abscesses drained via curvilinear incision over the most fluctuant site, the external incision and drainage procedure was straightforward, pus drained and cavity washed with antiseptic agent hydrogen peroxide and diluted povidone then packed with ribbon gauze along with corrugated drains attached, meanwhile abscess in the left nasopharynx addressed endoscopically, area of the maximal fullness inferior to torus tubarius identified. After an initial cut over the mucosa of the swelling done using coblator scalpel in order to create an opening with minimal bleeding, further probing and puncture into the abscess done using a blunt instrument i.e Fryer's elevator, pus was milked out and drained under endoscopic visualization, suction applied as soon as the pus was flowing out to avoid being aspirated, hemostasis was secured using bipolar cautery at the end of the procedure, a cavity was left open, no nasal packing or hemostatic sponges applied. Fig 5 photograph series describes the endoscopic drainage procedure.

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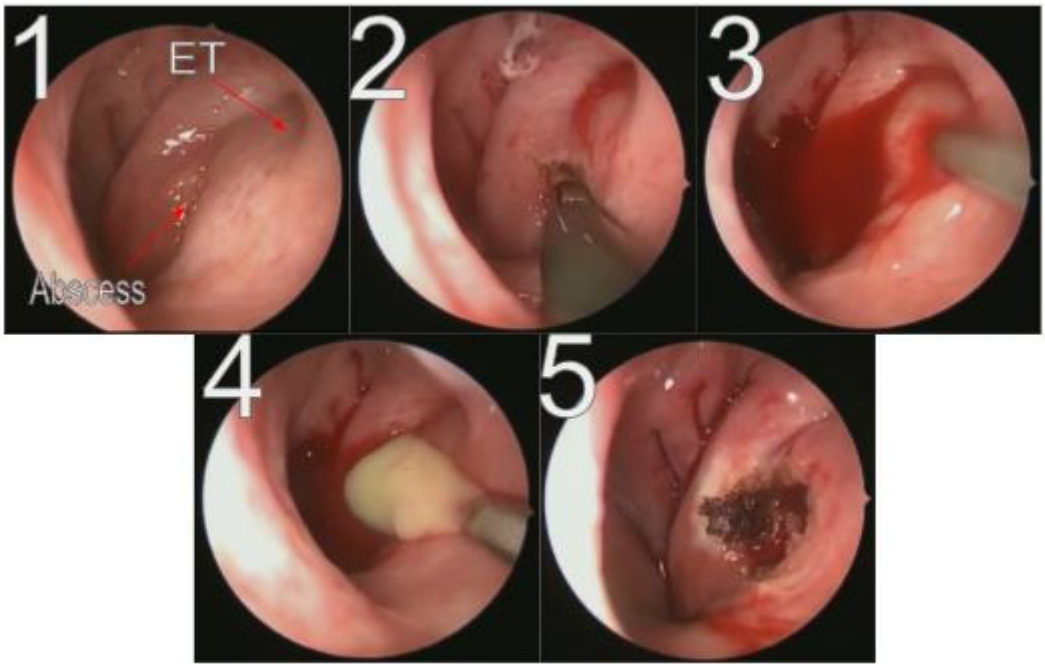

Fig5. Endoscopic drainage left sided nasopharyngeal abscess. 1 - Endoscopic view of abscess, 2 - Opening created using coblator, 3 - probing into the abscess, 4 - pus drainage, 5 - exteriorized abscess cavity post hemostasis

Post surgery patients' overall condition improved, kept in ward for an additional of 1 week of IV Cefuroxime, and regular gentle dressing for the neck wounds. Nasal douching using Sodium bicarbonate was advised to the patient on the next day post surgery for the purpose of maintaining nasopharyngeal hygiene. The patient discharged well at the end of the week, repeated nasal endoscopy performed prior to discharge, noted post drainage cavity clean and re-epithelialized. Culture from the pus sample drained however failed to yield any bacterial growth, multiple blood cultures did not yield any growth to suggest presence of septicemia as well.

DISCUSSION

Leukostasis (White Cell Count > 100,00/ml), an emergency medical condition associated with steep increase of blast cell count, seen particularly in AML, is the most plausible explanation for abscess formation following an initial infection[9]. Acute and subacute Cervical Lymphadenitidis usually respond well to systemic antibiotics[10], but however in this particular case it has progressed into suppurative cervical lymphadenitis and subsequently into full blown deep neck abscesses due to Leukostasis, despite a prolonged course of antibiotic therapy. A combination of factors could have contributed to the pathogenesis, including persistent presence of bacteria due to lack of phagocytic white blood cells from myelosuppression, poor microvascular perfusion and tumor lysis accelerated by cytotoxic chemotherapy[2][9].

In histopathological reports, the term “reactive lymph nodes” are often encountered, to describe nodes that only respond to an infection by cellular hyperplastic process, as opposed to when there is clear evidence of microbial invasion into the lymph nodes itself, whereby the term “infective lymphadenitis” are used instead, in practice however the two entities are not always clearly distinguishable from each other solely by histology, correlation to clinical history is essential. Histologically under low magnification, a reactive lymph node may reveal several features including sinus dilatation, vascular dilatation, capsular edema and accumulation of neutrophils if the etiology is bacterial. Further magnification with standard Hematoxylin-eosin staining, may reveal the following subclasses of features, 1- reactive follicular pattern (B cell response), 2 - diffuse paracortical hyperplasia pattern (T cell response), 3 - sinus histiocytosis pattern (hyperplastic histiocytes) or 4 - a mix of above mentioned patterns[5].

Daunorubicin is a cytotoxic agent classified as anthracycline topoisomerase inhibitor, the main antitumor mechanism is via induction of DNA damage by means of disrupting base pairing bond hence uncoiling of the

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double stranded helix structure. Other deduced mechanisms of tumor cell destruction of Daunorubicin include inhibition of polymerase activity, down regulation of gene expression and generation of free radicals [6]. In an animal study, Daunorubicin are observed to cause B-cells stimulation while T-cells are suppressed at a certain concentration [7], therefore we propose that, in the background of pre-existing nodal cellular hyperplasia which is often the case for reactive lymphadenitis to underlying chronic tonsillitis, B-cells were stimulated by Daunorubicin and underwent unregulated hyperplasia, leading to ischemia in the core of the lymph nodes hence forming the necrotic foci, further suppurative process may be due to presence of capsular neutrophils, which liquefied necrotic tissue into pus, and subsequently spread extranodally into neck abscess.

Even though there is no positive culture result to demonstrate bacteria involvement, we still presumed the presence of common upper respiratory tract bacteria in the process due to patient's history of underlying chronic tonsillitis, we are confident that our choice of early (and prolonged) empirical IV antibiotic has prevented a more serious outcome such as septicemia and disseminated abscesses of various organs. Brito et al 2017, found the most common primary foci which led to deep neck abscess among adults are the tonsils (31.68%), followed by infected teeth (23.7%), while other less common primary foci are infected cervical lymph nodes, upper airway mucosa and foreign bodies, meanwhile in a another 14.8%, no primary foci were found. The same study also noted that Streptococcus species (*pyogenes, pneumoniae, intermedius, viridans and contelattus*) are the most frequently isolated organism, followed by Staphylococci sp, Enterococci sp, Neisseria spp and Klebsiella sp [1][3]. Therefore empirical antibiotics that cover gram positive bacterias, particularly against streptococci are justified and should be started earliest possible to prevent further complications such as mediastinitis, systemic sepsis, Internal jugular vein thrombosis (Lemierre's syndrome), carotid blowout and airway compromise [3].

CONCLUSION

Deep neck space infection is a condition that needs to be anticipated in any immunocompromised patient presenting with acute cervical lymphadenitis, early empirical antibiotic and close surveillance should be the mainstay strategy. In patients where deep neck abscesses have already developed, surgical approaches to drain the abscesses should be well planned and individualized to ensure favorable outcome. As this case comes to light, we hope similar conditions encountered will be reported globally, for case series or even retrospective studies in the future will help to further refine practices of clinicians.

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