
ORIGINAL ARTICLE

Sonographic Features of Bacille Calmette–Guérin (BCG) Lymphadenitis

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ABSTRACT

Objective: To review the sonographic features of Bacille Calmette–Guérin (BCG) lymphadenitis.

Methods: Records of children less than 18 years old who presented with axillary swelling for sonography from November 2007 to May 2012, in whom with diagnosis of BCG lymphadenitis based on clinical findings (isolated ipsilateral enlarged axillary lymph nodes after BCG vaccination) were retrieved. They were identified from the Cluster Radiology Information System, and had to have no other identifiable cause of lymphadenitis. Those with a lesion situated at the cutaneous layer that was not suggestive of a lymph node were excluded. Age at presentation, site of BCG injection, sonographic features, subsequent management, and clinical outcomes were reviewed.

Results: Twelve patients (9 males, 3 females) were included. The age at presentation ranged from 2 to 20 months. All patients received BCG injection over the left deltoid. The maximum diameters of the axillary lymph nodes ranged from 0.9 cm to 2.5 cm. There were nine cases (75%) with lymph nodes showing multiple internal echogenic specks. Internal anechoic areas and posterior enhancement were observed in three cases (25%). Increase in Doppler flow was noted in five cases (42%). Eight patients were treated conservatively while four had incisions or aspirations performed. All patients ran a benign course with a reduction in size or resolution of the axillary swelling during subsequent clinical follow-up.

Conclusion: Sonographic features of BCG lymphadenitis are variable. Axillary lymph nodes with multiple internal echogenic specks were found in a relatively high proportion of our patients (75%) with this clinical diagnosis, and could be regarded as a sonographic feature of this condition.

Key Words: Lymph node; Lymphadenitis; Mycobacterium bovis; Vaccination; Ultrasonography

中文摘要

卡介苗 (BCG) 淋巴結炎的超聲影像

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目的：回顧卡介苗 (BCG) 淋巴結炎的超聲影像特徵。

方法：收集2007年11月至2012年5月期間，18歲以下因腋窩淋巴結腫大而超聲檢查的病人紀錄。根據單側（與BCG疫苗注射部位身體同側）腋窩淋巴結腫大的臨床症狀，他們均被診斷為患有BCG淋巴結炎。病人資料的來源為醫院聯網的放射學資訊系統。研究病人並無淋巴結炎的其他明確病因。但如果病灶位於皮膚表層而不牽涉淋巴結，這些病例不會被列入研究範圍。本研究會回顧病人病發時

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的年齡、注射BCG的位置、超聲影像特徵、治療方法及臨床預後。

結果：研究共12名病人（9男3女）的紀錄。病發年齡介乎2至20個月。所有病人均在左三角肌接受BCG注射，腋下淋巴結的最大直徑介乎0.9 cm至2.5 cm。其中9例（75%）在淋巴結處出現多發內部強回聲光點。3例（25%）出現內部無回聲區伴後方增強。5例（42%）可見多普勒血流信號增加。8名病人接受保守療法，另4人進行切除或穿刺。所有病人的病程在其後臨床隨訪中呈良性轉歸、腋窩腫脹減輕或消退。

結論：BCG淋巴結炎可呈現不同的超聲影像。本研究大部份臨床診斷為該病的病人（75%）在腋下淋巴結處都出現多發強回聲光點，所以可以作為此症超聲影像的一項特徵。

INTRODUCTION

Bacille Calmette–Guérin (BCG) vaccination is an attenuated strain of *Mycobacterium bovis* used for prevention of tuberculosis. All newborn babies are given this vaccine in Hong Kong, where neonatal coverage has persistently been around 99% since 1980.¹ Notably, BCG vaccination is associated with a low frequency of serious adverse reactions, and is considered to be safe.^{2,3}

Although adverse effects of BCG vaccination are uncommon, they may nevertheless be encountered in clinical settings, given the large number of vaccine recipients each year. Among these adverse effects, BCG lymphadenitis is one of the most common. The diagnosis of BCG lymphadenitis is based on clinical finding of isolated ipsilateral enlarged axillary lymphadenopathy after BCG vaccination, without any other identifiable cause. Descriptions of the sonographic features of BCG lymphadenitis in the English literature are scarce. Therefore the aim of this report was to review the sonographic features of BCG lymphadenitis.

METHODS

Records of children less than 18 years old who presented with axillary swelling for sonography from November 2007 to May 2012, with a diagnosis of isolated ipsilateral axillary lymphadenopathy after BCG vaccination and without any other identifiable cause, were retrieved from Cluster Radiology Information System. Those with lesion situated at cutaneous layer, which was not suggestive of a lymph node, were excluded. All sonographic examinations were performed with 5- to 17-MHz linear transducers. The sonographic findings of each subject were determined by retrospective analysis of the images for size, shape, echogenicity, internal anechoic area, posterior enhancement, and Doppler signal. The age at presentation, site of BCG injection, subsequent management, and clinical outcomes were also logged.

RESULTS

In all, 13 patients with eligible presentations were screened; one was excluded as the lesion was situated at cutaneous layer, which was not typical of a lymph node, leaving 12 subjects (9 males, 3 females). Nine of the 12 patients had solitary lymphadenitis. Each of the other three patients had two lymph nodes, which demonstrated the same sonographic features. The age at presentation ranged from 2 months to 20 months. All had had a BCG injection over the left deltoid region and on the same side as the lesion. The sonographic findings and clinical outcomes in patients with BCG lymphadenitis are summarised in the Table and illustrated in Figures 1 to 4. The maximum diameter of the axillary lymph nodes ranged from 0.9 cm to 2.5 cm. Lymph nodes were oval in shape in 10 subjects (83%), while one was round and one had two lobes. Lymph nodes with multiple internal echogenic specks (Figure 1) were noted in nine cases (75%), and in three individuals the node had an internal anechoic area and posterior enhancement (Figure 2). Heterogeneously hypoechoic lymph nodes (Figure 3) were found in 2 cases (17%). One patient had a hypoechoic lymph node with hyperechoic rim (Figure 4). Increased Doppler flow was observed in five cases (42%). None of the 12 cases yielded echogenicity with posterior shadowing to suggest presence of coarse calcification. Eight cases were treated conservatively. The other four had incision or aspiration performed, which yielded caseous or pus-like material. All patients ran a benign course with decreasing size or resolution of the axillary swelling during subsequent clinical follow-up period ranging from 1 month to 32 months after initial presentation.

DISCUSSION

While adverse effects of BCG vaccination are very rare, the BCG lymphadenitis is one of the most common complications. In Japan, where BCG vaccination has been used extensively, the frequency of

Table. Summary of the sonographic findings for 12 patients with Bacille Calmette–Guérin (BCG) lymphadenitis.

Case No.	Sex	Age (months)	No. of axillary LN	Maximum diameter (cm)	Shape	Echogenicity	Posterior enhancement	Internal anechoic region	Doppler flow	Treatment	Clinical outcome
1	M	12	1	1.9	Oval	Isoechoic with multiple echogenic specks	-	-	Increased	I&D	Resolving
2	M	6	1	2.5	Oval	Isoechoic with multiple echogenic specks	-	-	Nil	Nil	Static
3	M	2	2	1.2 / 1.1	Oval	Isoechoic with multiple echogenic specks	-	-	Nil	Aspiration	Subsided
4	M	3	2	1.6 / 0.9	Oval	Heterogeneous hypoechoic	-	-	Increased	Aspiration	Subsided
5	M	6	1	1.8	Oval	Hypoechoic with internal echogenic specks	-	-	Nil	Nil	Resolving
6	F	2	2	1.3 / 1.5	Oval	Internal echogenic specks	-	-	Increased	Nil	Static
7	M	8	1	1.7	Oval	Internal echogenic specks	-	-	Nil	Nil	Resolving
8	M	3	1	1.6	Bilobed	Hypoechoic with internal echogenic specks	-	-	Increased	Nil	Resolving
9	F	2	1	1.5	Oval	Hypoechoic with internal echogenic specks	-	-	Increased	Nil	Subsided
10	M	9	1	2.1	Oval	Hypoechoic with hyperechoic rim	+	+	Nil	Nil	Resolving
11	F	3	1	1.9	Round	Hypoechoic with internal echogenic specks	+	+	Nil	I&D	Subsided
12	M	20	1	1.8	Oval	Heterogeneous hypoechoic	+	+	Nil	Nil	Resolving

Abbreviations: LN = lymph node; I&D = incision and drainage.

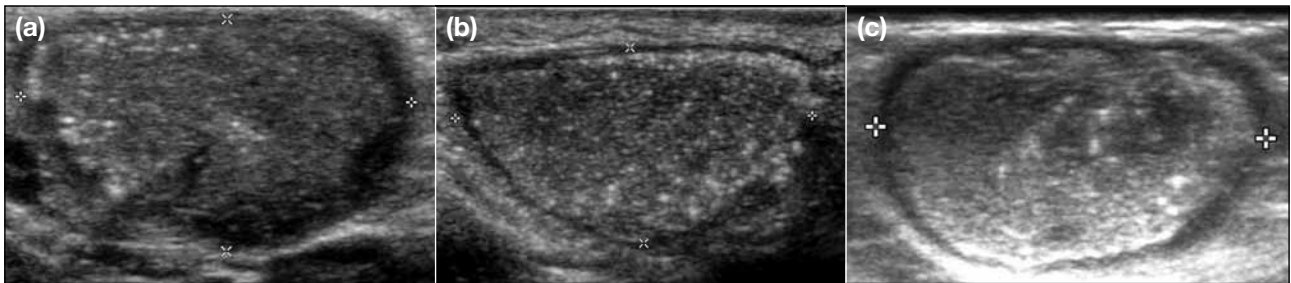


Figure 1. Sonograms showing lymph nodes with multiple internal echogenic specks in cases (a) 1, (b) 2, and (c) 6. Calipers outline the lymph node.

lymphadenopathy was found to be 0.73% in a study of 34,516 vaccinated children.⁴

The diagnosis of BCG lymphadenitis is basically clinical. Though BCG lymphadenitis may develop as early as two weeks after vaccination, most of the time it appears within six months and almost always within 24 months.⁵⁻⁸ BCG vaccination is recommended and is given to nearly all newborns at birth in Hong Kong, with the coverage being around 99%. The recognition of the characteristic clinical features usually lead to a diagnosis.^{2,8,9} Typically the presentation entails ipsilateral axillary (rarely supraclavicular or cervical) lymph node enlargement after recent BCG vaccination, which is not associated with fever or constitutional symptoms and occurs in the absence of other attributable causes.

All of our patients had BCG injection over the left deltoid region and presented with left axillary swelling at age from 2 to 20 months, with a mean of 6 months. All cases showed a benign clinical course with a gradual decreasing size of the axillary swelling upon follow-up. These features are entirely compatible with BCG lymphadenitis.

There is not much literature on the sonographic features of BCG lymphadenitis. In our study, their sonographic features were variable, and ranged from multiple internal echogenic specks, to internal anechoic areas with posterior enhancement, and heterogeneously hypoechoic signals. Multiple internal echogenic specks were found in relatively high proportion (75%) of our subjects. The exact histological nature of these echogenic specks is not known and requires pathological exploration.



Figure 2. Sonogram of lymph node with internal anechoic area and posterior enhancement of case 12. Calipers outline the lymph node.



Figure 3. Sonogram of lymph node showing heterogeneous echogenicity in case 4.

According to one report, in about 30 to 80% of cases, the affected lymph nodes may enlarge progressively and develop suppuration, giving rise to fluctuation in the swelling together with erythema and oedema of overlying skin.⁸ Three cases in our series were found to have anechoic area and posterior acoustic enhancement, suggestive of suppurative change.



Figure 4. Sonogram of hypoechoic lymph node with hyperechoic rim in case 10. Calipers outline the lymph node.

The major limitation of this study was the lack of histological proof. However, as the BCG lymphadenitis is a relatively benign disease, the diagnosis is basically clinical and invasive investigation is usually not indicated.

CONCLUSION

Sonographic features of BCG lymphadenitis are variable. Axillary lymph nodes with multiple internal echogenic specks were found in a relatively high proportion of patients with this clinical diagnosis.

REFERENCES

1. Department of Health, HKSAR. Annual report of TB and Chest Service. 2000-2009. Available from: http://www.info.gov.hk/tb_chest/contents/c56.htm. Accessed 24 Aug 2012.
2. Lotte A, Wasz-Hockert O, Poisson N, Engbaek H, Landmann H, Quast U, et al. Second IUATLD study on complications induced by intradermal BCG-vaccination. *Bull Int Union Tuberc Lung Dis.* 1988;63:47-59.
3. Milstien JB, Gibson JJ. Quality control of BCG vaccine by WHO: a review of factors that may influence vaccine effectiveness and safety. *Bull World Health Organ.* 1990;68:93-108.
4. Mori T, Yamauchi Y, Shiozawa K. Lymph node swelling due to bacille Calmette-Guerin vaccination with multipuncture method. *Tuber Lung Dis.* 1996;77:269-73.
5. Hsing CT. Local reactions after BCG vaccination. *Am Rev Respir Dis.* 1963;88:402-5.
6. Chaves-Carballo E, Sanchez GA. Regional lymphadenitis following BCG vaccination (BCGitis). Clinical comments based upon 25 instances among 1295 childhood vaccinees. *Clin Pediatr (Phila).* 1972;11:693-7.
7. Victoria MS, Shah BR. Bacillus Calmette-Guérin lymphadenitis: a case report and review of the literature. *Pediatr Infect Dis.* 1985;4:295-6.
8. Goraya JS, Viridi VS. Bacille Calmette-Guérin lymphadenitis. *Postgrad Med J.* 2002;78:327-9.
9. Helmick CG, D'Souza AJ, Goddard N. An outbreak of severe BCG axillary lymphadenitis in Saint Lucia, 1982-83. *West Indian Med J.* 1986;35:12-7.