Cutaneous Botryomycosis in Immunocompetent Patients: A Case Series

Abstract
Botryomycosis is a rare chronic suppurative bacterial infection of skin and viscera mostly reported in immunocompromised adults. Most of published literature on botryomycosis are case reports. Though morphological presentation of cutaneous botryomycosis has been described as nodules, sinus, abscesses, and ulcers discharging seropurulent exudates, sequential evolution of lesions is not clear. We report a series of three cases of cutaneous botryomycosis in immunocompetent patients (one child and two adults). Two cases had localized lesion, while adult male had lesions in a sporotrichoid distribution. In all cases the lesions evolved in the form of appearance of subcutaneous swellings which later on developed multiple nodules and papules on surface which either developed erosion, ulceration or sinus on surface associated with seropurulent discharge. The organisms isolated from discharge and tissue culture were coagulase negative staphylococcus and methicillin sensitive staphylococcus aureus. All cases were treated with monotherapy of sensitive systemic antibiotic. Two patients fully recovered and one lost to follow-up in the middle of therapy.

Keywords: Cutaneous botryomycosis, evolution, lobulated swelling, morphology, sporotrichoid pattern, ulcerated papule and nodule

Introduction
Cutaneous botryomycosis is a rare and chronic suppurative bacterial infection with commonest causative organism being S. aureus.[1,2] Most of published literature on botryomycosis are case reports. It has been commonly reported in immunocompromised adults and usually occurs over trauma prone areas following local injury or at post-operative sites.[3] Skin lesions usually present as papules, nodules, fistulas, abscesses, and ulcers with seropurulent discharge.[3] However, characteristic morphological features giving clue to the diagnosis of cutaneous botryomycosis are unknown. It is usually treated with specific antibiotic based on culture sensitivity either single or combination of multiple drugs for prolonged duration.

We present three immunocompetent patients of cutaneous botryomycosis with lesions present on various parts of body with different distribution patterns and evolution of lesions; and were successfully treated with sensitive antibiotic monotherapy.

Case Report
Three immunocompetent patients (one child and two adults) presented with subcutaneous swellings with seropurulent discharge at various sites of body. Case 1 and 2 had localized lesions whereas case 3 had lesions in a sporotrichoid distribution. Case 1, 15-year old female child came with multiple erythematous mildly painful, subcutaneous swellings over left side of forehead and upper eyelid with ulceration and seropurulent discharge since 4 years [Figure 1a]. There was preceding history of trauma over forehead 6 years back. The lesions started as subcutaneous swellings at one end of the scar and underwent ulceration on surface of swelling with few lesions developing sinuses giving seropurulent discharge after around 4 to 6 weeks. Surgical drainage was done on two occasions within one year without any significant improvement. Based on the history and clinical examination, differential diagnoses of botryomycosis, actinomycetoma or eumycetoma, scrofuloderma were considered. Routine haematological parameters were within normal limits. HIV 1and 2 were negative. X-ray of skull didn’t reveal any bony abnormalities. Mantoux test was negative. Culture of discharge and tissue showed growth of coagulase negative staphylococcus sensitive to doxycycline.

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Histopathology from the nodule showed bacterial colonies in dermis with an eosinophilic rim at the periphery suggestive of Splendore–Hoeppli phenomenon [Figure 1b and c]. A diagnosis of botryomycosis was made and oral doxycycline 100 mg twice daily was started. The lesions resolved completely after 4 weeks [Figure 1d]. We continued the drug for 6 more weeks after the clinical cure. The patient didn’t develop any side effects to doxycycline. Currently the patient is under follow up without any recurrence in last 5 months. Demographic details, and morphology and evolution of lesions in all cases have been described in Table 1.

### Table 1: Demographic details, history, evolution, morphology, treatment and outcome of patients

| Characteristics                  | Case 1                                      | Case 2                                      | Case 3                                      |
|----------------------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|
| Age/Sex                          | 15 years, Female                            | 38 years, Female                            | 28 years, Female                            |
| Duration                         | 4 years                                     | 5 years                                     | 5 years                                     |
| Sites                            | Forehead and left upper eyelid              | Upper back                                  | Left knee and inguinal area                 |
| Prior history of trauma          | Yes                                         | No                                          | Yes                                         |
| Evolution                        | Subcutaneous swellings followed by ulceration, sinus on surface, seropurulent discharge after around 4 to 6 weeks | Subcutaneous swellings, with subsequent appearance of multiple papules and nodules on the surface of the swellings at one to two weeks interval, Surface ulceration of individual papules and nodules with seropurulent discharge at 7 to 10 days interval | Subcutaneous swelling with subsequent appearance of multiple papules and nodules on the surface of large swelling after two months. Surface ulceration of individual papules and nodules, sinus formation with seropurulent discharge. |
| Morphology                       | Forehead and left upper eyelid-Multiple swellings with ulceration and crusting | Diffuse swelling on upper back and nape of the neck, Multiple papules, nodules, nodules with surface ulceration, sinuses, seropurulent discharge, Nodules with pedunculated granulation tissue (pyogenic granuloma like morphology), hypopigmented and depressed scars on the surface of large swelling [Figure 2a and b]. Plate like subcutaneous mass on the nape of neck [Figure 2b]. | Subcutaneous lobulated swellings over left knee Studded with multiple papules, nodules, nodules with ulceration, ulcers with granulation tissue (pyogenic granuloma like) and multiple sinuses [Figure 3a and b]. Proximal thigh- a plate like mass studded with papules, nodules, scars and sinuses [Figure 3c]. |
| Investigations                   | Pus and tissue culture-coagulase negative staphylococcus sensitive to doxycycline | Pus and tissue culture-coagulase negative staphylococcus sensitive to ciprofloxacin. HIV 1 and 2-negative | HIV 1 and 2-negative Mantoux-negative KOH and fungal culture of pus-negative Histopathology-clustered basophilic granules surrounded by prominent eosinophilic club of Splendore-Hoeppli material deep in dermis [Figure 2c]. |
|                                  | HIV 1 and 2-negative                         | HIV 1 and 2-negative                         | HIV 1 and 2-negative Mantoux-negative KOH and fungal culture of pus-negative Histopathology-basophilic bacterial granules in dermis with eosinophilic rim suggestive of SHP[Figure 4]. |
|                                  | Mantoux-negative                             | KOH and fungal culture of pus-negative       | KOH and fungal culture of pus-negative       |
|                                  | KOH and fungal culture of pus-negative       | Histopathology-bacterial colonies in dermis with an eosinophilic rim at the periphery suggestive of Splendore-Hoeppli phenomenon | Histopathology-bacterial colonies in dermis with an eosinophilic rim at the periphery suggestive of Splendore-Hoeppli phenomenon |
| Treatment                        | Oral doxycycline 100 mg twice daily          | Oral Ciprofloxacin 500 mg twice daily        | Oral doxycycline 100mg twice daily 60% and 80% improvement of knee and thigh lesions respectively following 20 days of doxycycline [Figure 5]. |
| Outcome                          | Complete resolution following 4 weeks of doxycycline | Complete resolution following 8 weeks of ciprofloxacin [Figure 2d]. Continued ciprofloxacin for 6 weeks more after clinical cure | No side effects to ciprofloxacin. |
|                                  | Continued doxycycline for 6 more weeks after the clinical cure. No side effects to doxycycline | Continued ciprofloxacin for 6 weeks more after clinical cure | 60% and 80% improvement of knee and thigh lesions respectively following 20 days of doxycycline [Figure 5]. |

**Discussion**

Botryomycosis can involve skin and viscera. Around 200 cases have been reported from all over the world.[3] The present report is series of three cases of cutaneous botryomycosis.

Majority of reported cases of cutaneous botryomycosis are immunocompromised adults and has been reported rarely in children.[4] All our cases were immunocompetent with one child and two adults. Common organisms causing botryomycosis include *Staphylococcus aureus,*
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Pseudomonas aeruginosa, coagulase-negative staphylococci, Streptococcus spp, Escherichia coli and Proteus spp.[3] In the present series, the organism isolated were coagulase negative staphylococcus in child and adult female and MSSA (methicillin sensitive staphylococcus aureus) in adult male. Various predisposing factors and co-morbid conditions associated with botryomycosis include altered immune function, diabetes mellitus, liver disease, alcoholism, lupus, cystic fibrosis, asthma, malnutrition, immunoglobulin deficiency, hyperglobulinemia E (Job syndrome), glomerulonephritis, long term treatment with corticosteroids and human immunodeficiency virus/acquired immunodeficiency syndrome.[5,6] Factors like accident and post-operative skin trauma help in entry of the organism and thereby leading to localized infections.[7] Except prior history of local trauma in case 1 and 3, there was no other associated co-morbid condition in our cases. Described morphological
presentation of cutaneous botryomycosis include nodules, sinus, abscesses, and ulcers giving a sero-purulent exudate with occasional granules of bacteria. In the present series, besides the appearance of nodule, subcutaneous swelling, sinus and ulcer, we observed few nodules with ulceration and granulation tissue giving morphology of pyogenic granuloma in case 2 and 3. Secondly, the third case was interesting since the lesions were in a linear sporotrichoid pattern which has not been described previously in literature.

In botryomycosis, there occurs formation of a rim of eosinophilic matrix composed of antigen-antibody complex, tissue debris and fibrin around the bacterial granules and colonies called Splendore–Hoepli phenomenon (SHP), which prevents phagocytosis and intracellular destruction of the bacteria leading to chronic infection. The grains in botryomycosis are large and lobulated which are cluster of bacteria that does not have a filamentous structure (like grains of mycetoma and actinomycosis). All our cases had bacterial granules which demonstrated SHP in histopathology.

Botryomycosis should be clinically differentiated from other conditions like mycetoma, actinomycosis, actinomycetoma, nocardiosis and tuberculosis that presents as swellings with sinus and discharge. However, there has been no clear cut morphological differentiation of above entities. In the present case series, we observed evolution of lesions of botryomycosis which could help in reaching at clinical diagnosis of botryomycosis. All cases developed subcutaneous swelling, followed by papule and nodule over the swelling which either developed, erosion, ulceration or sinus giving seropurulent discharge. In case 2 and 3 few sinuses and nodules developed pedunculated granulation tissue giving an appearance of pyogenic granuloma. Such an evolution noted in our cases could be possibly due to localized inflammation occurring around the organisms giving rise to subcutaneous swelling, which later on extruded out by formation of nodules, papule, and sinus on the surface of subcutaneous swelling. These lesions underwent secondary changes like erosion, ulceration and sinus on the papules and nodules. The sporotrichoid distribution in case 3 could be due the lymphatic spread.

The diagnosis of botryomycosis is usually confirmed by demonstration of specific bacteria in discharge, tissue culture and characteristic histopathology findings. The causative organisms detected in tissue and pus culture were coagulase negative staphylococci in case 1 and 2 and MSSA in case 3 which ruled out other differentials like mycetoma, nocardiosis and tuberculosis.

The treatment with prolonged course of antibiotics depending upon pus culture and sensitivity is recommended for botryomycosis. However, appropriate antibiotics in combination with surgical excision is the most effective therapy for botryomycosis. All our cases were treated with prolonged treatment with single sensitive antibiotic. Two cases were treated with doxycycline monotherapy whereas the adult female was treated with ciprofloxacin similar to the report by Pradhan et al. None of the cases needed any surgical intervention.

**Conclusion**

From the present series of three cases, we suggest the evolution of lesions along with demonstration of bacteria in the discharge and tissue culture and characteristic histopathology findings can help to diagnose botryomycosis. Secondly, we also highlight new morphological findings like pyogenic granuloma like lesions and sporotrichoid distribution that can occur in the botryomycosis.

**Declaration of patient consent**

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Nil.
Conflicts of interest

There are no conflicts of interest.

References

1. Bonifaz A, Carrasco E. Botryomycosis. Int J Dermatol 1996;35:381-8.
2. Machado CR, Schubach AO, Conceição-Silva F, Quintella LP, Lourenço MC, Carregal E, et al. Botryomycosis. Dermatology 2005;211:303-4.
3. Padilla-Desgarennes C, Vázquez-González D, Bonifaz A. Botryomycosis. Clin Dermatol 2012;30:397-402.
4. Pradhan S, Sirka CS, Panda M, Baisakh M. Cutaneous botryomycosis treated successfully with injectable ceftriaxone sodium in an immunocompetent child. Indian J Dermatol Venereol Leprol 2018;84:485-7.
5. Vasishta RK, Gupta N, Kakkar N. Botryomycosis-A series of six integumentary or visceral cases from India. Ann Trop Med Parasitol 2004;98:623-9.
6. Saadat P, Ram R, Sohrabian S, Vadmal MS. Botryomycosis caused by Staphylococcus aureus and Pneumocystis carinii in a patient with acquired immunodeficiency disease. Clin Exp Dermatol 2008;33:266-9.
7. Follows GA, Mathew J, Lucas S, Black MJ, Goodship TH. Cutaneous botryomycosis in a patient with lupus nephritis. Nephrol Dial Transplant 1998;13:3200-1.
8. Chintaginjala A, Harshavardhan K, Senthil Kumar AL. Cutaneous botryomycosis: A rare case report. Indian J Dermatol 2016;61:126.
9. Bersoff-Matcha SJ, Roper CC, Liapis H, Little JR. Primary pulmonary botryomycosis: Case report and review. Clin Infect Dis 1998;26:620-4.
10. Akiyama H, Kanzaki H, Tada J, Arata J. Staphylococcus aureus infection on cut wounds in the mouse skin: Experimental staphylococcal botryomycosis. J Dermatol Sci 1996;11:234-8.