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A Retrospective Chart Review of Inflamed Epidermal Inclusion Cysts

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ABSTRACT

Background: Epidermal inclusion cysts (EIC) are one of the most common forms of cysts found on and/or underneath the skin. Inflamed EICs typically show signs and symptoms such as pain and erythema, mimicking cutaneous abscess. However, prior studies have demonstrated at least 20% of lesions are culture negative.

Objective: To determine the rate of culture positivity in mild inflamed epidermal inclusion cysts, in particular to identify whether empiric antibiotics are warranted.

Methods: In a retrospective chart review 76 cases of inflamed EIC that were mild (lacking systemic symptoms) were analyzed who presented to the department of dermatology at Mount Sinai between 2016–2019.

Results: Of cultures taken from inflamed cysts, 47% resulted in no bacterial growth or growth of normal flora, 38.4% resulted in growth of aerobic bacteria with methicillin-resistant *Staphylococcus aureus* (8%), *Staphylococcus lugdunensis* (5%), and methicillin-sensitive *Staphylococcus aureus* (13%) predominating, and 9.3% resulting in growth of anaerobic bacteria with *Finegoldia magna, Peptostreptococcus, and Cutibacterium acnes* presenting. Review of prescribed treatment regimens often involved antibiotic medication, despite a high prevalence of negative culture.

Conclusions: Almost half of cases of mild inflamed EIC (lacking systemic symptoms) cultured will not grow pathogenic bacteria, therefore incision and drainage with culture and appropriate therapy is a viable therapeutic option in uncomplicated inflamed EIC lesions. In this way, over prescription of antibiotics can be minimized.

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INTRODUCTION

Epidermal inclusion cyst (EIC) is one of the most commonly acquired skin cysts. It originates from the proliferation of epidermal cells that lost connection to the surface, forming a closed sac with a definite wall. EIC can be found in any area of the body, typically presenting as nodules under the skin, along with a visible central punctum. EIC may become enlarged, inflamed, infected, or remain stable; however, there are no factors that reliably predict whether the cyst will become inflamed or not. If inflammation does occur, the cyst becomes symptomatic, typically red and painful, mimicking active abscess infection. It may rupture spontaneously or may require surgical drainage followed by a course of systemic antibiotics. The source of infection usually comes from normal skin flora organisms, colonized bacteria or other potential pathogens.[1]

Overprescribing of antibiotics in dermatology is a timely topic. A recent article has highlighted 35.4% rise in the usage of short-term antibiotics for cysts between 2008 and 2016, despite an overall reduction in antibiotic usage, supporting the need for improved antibiotic prescribing in the setting of cysts.[2] The aim of this study was to determine whether bacterial infection plays a significant role in inflamed EIC, and evaluate treatment regimens utilized.

METHODS

After institutional review board exception, researchers compiled and recorded data on patients who presented with inflamed EIC(s) to the Department of Dermatology at Mount Sinai. Inflamed EIC was defined as a mobile cyst that was surrounded by erythema and contained a localized collection of purulent material. Patients with systemic symptoms such as fever or malaise were excluded from review. The inclusion criteria for chart review were dermatologic evaluation, presence of a clinically diagnosed EIC and performance of bacterial culture on the contents of the diagnosed EIC. One hundred-six patients with EIC were identified but only 76 patients met study criteria. The researcher(s) recorded patient age, sex or gender, location of the cultured EIC including laterality, comorbidities, culture results and type (aerobic, anaerobic, or both), and the courses of treatment (including incision and drainage, intralesional

TABLE 1.

Identified Bacterial Isolates in the Inflamed Epidermal Inclusion Cysts (53% of EIC lesions had culture growth)	
Organism	**Cases**
Aerobes	
Gram positive bacteria	
Staphylococcus Aureus (non-MRSA)	10
Staphylococcus Lugdunensis	4
Methicillin-Resistant Staphylococcus Aureus	6
Staphylococcus Capitis	1
Group B Streptococcus (Beta-hemolytic)	1
Viridans Group Streptococci	1
Gram negative bacteria	
Pseudomonas Aeruginosa	1
Enterococcus Faecalis	3
Serratia Marsescens	1
Proteus Mirabilis	2
Klebsiella Oxytoca	1
E. Coli	1
Pantoea agglomerans	1
Anaerobic	
Finegoldia Magna	3
Peptostreptococcus (presumptive ID)	2
Cutlibacterium acnes	3
Normal Results	
No Bacterial Growth	27
Normal Flora	18
Total: *10 cultures were taken dually, their results are included in the numbers above	**86**

TABLE 2.

Therapeutics of Inflamed EIC Lesions (Total n=76 lesions)	
Treatment	
Antibiotic	**Prescription Recurrence**
Doxycycline	4
coupled with other therapies	21
Mupirocin/Bactroban Ointment	3
coupled with other therapies	21
Cephalexin	0
coupled with other therapies	4
Clindamycin gel	1
coupled with other therapies	4
Clindamycin oral (not coupled)	1
Minocycline/Solodyn/Minocyl	7
coupled with other therapies	9
Amoxicillin-Clavulanate	1
Non-Antibiotic	
Hydrogen Peroxide (only coupled)	2
Incision & Drainage (Lido-Epi-Tetracaine included)	3
coupled with other therapies	22
Chlorhexidine Wash	1
coupled with other therapies	6
Referred to Plastic Surgeon for Excision	1
Resolved by self	2

triamcinolone acetonide, topical anti-infective agents, and oral antibiotics). There were 76 patients from 2016-2019 identified as meeting the criteria required for consideration in the study. No patient reported fever or systemic symptoms. Culture results were identified and sectioned based on the type of bacteria cultured. Courses of treatment were broken down by whether they were antibiotic or non-antibiotic, topical, systemic, intralesional, or surgical (incision and drainage and/or excision), along with whether they were coupled with other therapies at the time of prescription.

RESULTS

As reflected in Table 1, of the 76 patients with cultures taken of their EIC contents, 36 patients had normal cultures (47%), of whom 19 (25%) had no growth and 17 had growth of normal flora (22%).[2] 41 positive cultures were identified, including 10 (13%) that grew methicillin-sensitive *S. Aureus* (MSSA), 6 (8%) that grew methicillin-resistant *S. Aureus* (MRSA), and 4 (5%) that grew *S. Lugdunensis*. *Finegoldia magna* was the most prevalent anaerobic organism found, comprising 3 (4%) of 76 cases. Three (4%) patients were culture positive for *Cutibacterium acnes* and 1 (1%) for *Peptostreptococcus*, as would be noted in acne and hidradenitis suppurativa lesions.

As shown in Table 2, treatments prescribed included oral antibiotics: doxycycline (n=25), minocycline (n=13), cephalexin (n=7), amoxicillin-clavulanate (n=2), clindamycin (n=1), and cefdinir (n=1). Twenty-six patients were not initially treated with antibiotics (n=26); eight of these cases turned out to be culture positive lesions (2 *Staphylococcus aureus* light/scant growth, 2 *Peptostreptococcus*, 1 *Staphylococcus aureus* with heavy growth, 1 *Staphylococcus capitis*, 1 *Proteus mirabilis*, and 1 *Strep viridans*), by using intralesional triamcinolone acetonide (n=4), incision and drainage (n=6), mupirocin (n=5), and clorhexidine wash (n=1). Four patients required the addition of an oral antibiotic (4 of 41; 10%) based on the bacterial isolates, ie, 50% of the untreated culture positive (4 of 8 cases). Five cases had recurrent symptoms after treatment and 4 were referred for excision. Overall, 16 patients received intralesional triamcinolone acetonide, 25 patients had incision and drainage, 30 received topical therapy (mupirocin, retapamulin or chlorhexidine wash). In the group of 76, only two cases resolved by themselves without prescription or therapies. EIC locations included intertriginous locations (n=19; groin,

n=11, axilla, n= 8), back (n=18), upper extremity (n=6), buttocks (n=6), chest (n=6), lower extremity (n=5), neck (n=5), face (n=5), scalp (n=5); a few patients were noted to have multiple cysts simultaneously, explaining the overlap of location.

DISCUSSION

We have studied the results of inflamed EIC cultures in the population at our department to understand how often bacterial infection plays a role in the inflammatory process, and which are the most common infectious agents. A significant portion of cultures revealed bacterial infections of a broad range, however we found that 47% of the cultures revealed no bacterial growth or normal bacterial flora.

In comparison to inflamed EIC lesions in our study, Kuniyuki described 21% having no pathogenic bacterial growth. In our study, the most prevalent cultured bacteria, methicillin sensitive *S. Aureus* (MSSA), was relatively common; but this bacteria was not exceptionally prevalent in other studies.[3] In a similar study from 2008, the most prevalent aerobe found was *Coagulase-negative Staphylococcus* (*lugdunensis and epidermidis*),[3,4] yet in our patient population, only 4 cultures reported this result. S. Aureus was common in our patient group, a result found in some studies but not realized in others.[4,5,6] There were no anaerobes found to be more prevalent than others, but overall appearing nearly equal in prevalence to other studies.[4,5] The lab grew out anaerobic bacteria in 24% (n=18) of EIC's were found on the back, with 15% (n=11) found on the groin.

Methicillin resistance was present in only 8 of 21 *Staphylococcus aureus* isolates. Furthermore, 47% of inflamed EIC lesions grew no pathogenic bacteria. Additionally, of the EIC lesions initially not treated systemically with antibiotics, only half later required therapy. Therefore, it appears that in our region, incision and drainage, followed by culture, and antibiotic therapy only in response to positive cultures is a regimen supported by the data. The clearance of symptoms in some patients with positive cultures without oral antibiotics suggests that immunocompetent individuals may improve with conservative therapy half of the time. This is similar to historic data from Diven et al who reported only 108 of 192 cultured lesions were positive for bacteria.[5] In the setting of hidradenitis suppurativa, one case has supported lesion formation with friction. In the setting of culture positive for *Cutibacterium acnes*, we believe that inflammation may be triggered similar to acne lesions.[7] The mechanism by which inflammation in cysts is triggered is unclear, however, histopathology of lesions supports foreign body reaction to cyst contents.[8]

Our work, though smaller than other studies, reaffirms concerns of overprescribing of oral antibiotics in cutaneous abscesses.[2] The issue of antibiotic resistance should be kept in mind when prescribing an antibiotic of any nature, topical or oral. While not all courses of treatment recorded in our patients were antibiotics, both prescribed singularly and dually with other therapies, the overwhelming majority of treatments prescribed in various series were antibiotics.[8,9] By prescribing only when sufficient warrant for prescription of an antibiotic exists, particularly in the case of bacterial infections, there are many suggested benefits including reducing the chances of increasing bacterial resistances, such as MRSA, as well as improving the health outcomes of the patient, including the reduction of side effects from antimicrobial therapy.[10,11]

Current guidelines from the Infectious Diseases Society of America released in 2014 recommend incision and drainage for all purulent lesions, with the addition of culture and sensitivity and empiric antibiotics or defined antibiotics in moderate (purulent infection with systemic signs of infection) to severe cases (patients who have failed incision and drainage plus oral antibiotics, with systemic signs of infection such as tachycardia and elevated temperature or abnormal white blood cell count, or the immunocompromised).[11] A recent multi-center, placebo-controlled trial of therapies for small abscesses randomized incision and drainage alone (placebo) against incision and drainage plus either trimethoprim-sulfamethoxazole or clindamycin in the setting of six urban urgicare or emergency departments. This study demonstrated benefit of clindamycin and trimethoprim-sulfamethoxazole with incision and drainage over placebo in *Staphylococcus aureus* positive lesions (67% of the cases). "The cure rates among participants with an abscess that did not grow *S. aureus* in culture were similar for all treatment groups in the intention-to-treat population and the population that could be evaluated (P=0.99 for all comparisons)"[13] While Emergency Departments deal with abscesses, not necessarily cysts that develop erythema and other signs of inflammation, our series and previously reported cases, in the mild EIC with noted purulence, the dermatologist may perform incision and drainage with associated culture and sensitivity, and prescribing based on the results. Where empiric therapy is chosen, doxycycline is supported as first line therapy from our cases, however, the recent literature from emergency care supports oral clindamycin or oral trimethoprim-sulfamethoxazole therapy with incision and drainage over incision and drainage alone, with increased risk of side effects with both active agents. Usage for 5–10 days can be chosen depending on severity and response to therapy.[13]

CONCLUSIONS

In the dermatology outpatient office, inflamed epidermal inclusion cysts may not grow bacteria on culture in almost half of cases. Furthermore, bacteria that do grow can vary extensively and may favor Methicillin-sensitive *staphylococcus aureus* as it does in our institution, therefore incision and drainage with culture and therapy appropriate to the patient is ideal in mild EIC lesions to reduce overprescribing of antibiotics.

DISCLOSURES

The authors declare no conflicts of interest.

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