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Carbuncle

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Introduction

A **carbuncle** is a contiguous collection of two or more furuncles.^{[1][2][3][4][5][6]} A **carbuncle** is an infection of the hair follicle(s) that extends into the surrounding skin and deep underlying subcutaneous tissue.^[7] They typically present as an erythematous, tender, inflamed, fluctuant nodule with multiple draining sinus tracts or pustules on the surface.^[7] Systemic symptoms are usually present, and regional lymphadenopathy may occur.^[3] They can arise in any hair-bearing location on the body; however, they are most common in areas with thicker skin such as the posterior neck, back, and thighs.^[5] A **carbuncle** can start as a folliculitis, which, if left untreated, can lead to a furuncle, and when multiple furuncles are contiguous, it becomes classified as a **carbuncle**.^[5] Carbuncles can be solitary or multiple.^[4]

Etiology

Bacterial infection within the hair follicle causes carbuncles.^{[1][3][4][5][6][8]} The most common causative organism is *Staphylococcus aureus* and frequently involves methicillin-resistant *Staphylococcus aureus*.^{[2][5][9][10]} Occasionally, carbuncles can be caused by anaerobic bacteria, especially in cases that are recurrent and involve the anogenital region.^{[1][6][11]}

Staphylococcus aureus can normally be found on intact skin most commonly in intertriginous areas such as the groin, axilla, buttocks, and neck.^{[2][4][5]} It can also be present in the nares.^[10] *Staphylococcus aureus* can be transferred to other anatomical locations by scratching. When the skin barrier is broken down or disrupted, bacteria can inoculate the hair follicle. Once inoculated, the bacteria can proliferate and lead to folliculitis, furuncle, and/or **carbuncle**.^{[1][6][8]}

Epidemiology

The incidence of carbuncles is uncertain; however, they are considered relatively common.^{[9][12]} They are most often found in young to middle-aged adults, being uncommon in early childhood.^[5] Carbuncles are known to affect males more than females.^[13]

Predisposing conditions that lead to a compromised or broken down skin barrier include eczema, diabetes mellitus, alcohol use disorder, malnutrition, immunodeficiency, obesity, and poor hygiene.^{[2][6][13]} Other predisposing factors include chronic methicillin-resistant *Staphylococcus aureus* (MRSA) colonization, living in crowded conditions, hyperhidrosis, and anemia.^{[5][10]}

History and Physical

A patient presenting with a **carbuncle** typically provides a history of a slowly enlarging tender nodule. The patient may state that it started as a "pimple" or pustule that they tried to pop, however over several days to weeks, the lesion grew progressively larger and became tender and fluctuant. Carbuncles are known to cause systemic symptoms; however, this is not mandatory for the diagnosis. Systemic symptoms may include regional lymphadenopathy, fever, fatigue, and malaise.^{[5][6][13]}

A **carbuncle** classically presents as a red, erythematous, painful nodule, with multiple overlying pustules.^{[4][5][7]} Frequently, the pustules rupture due to minor trauma, friction, or pressure, which can create an overlying hematogenous crust.^{[6][8][13]} Anatomically, carbuncles are associated with the hair follicle and thus can

occur at any hair-bearing surface.[3] However, there is a strong predilection for the nape of the neck, face, back, buttocks, axillae, and groin.[1][3][6][13]

Evaluation

A **carbuncle** diagnosis is typically made based on physical examination findings. When a **carbuncle** is suspected, it is important to obtain a bacterial culture and sensitivity from the purulent fluid within the **carbuncle**. [2][4] The bacterial swab must be taken before the initiation of antibiotics. The bacterial culture and sensitivities are important in guiding antibiotic therapy and to rule out MRSA or any gram-negative bacteria as the causative agents. [10][14] If systemic symptoms are present, a complete blood count may be obtained. Additionally, if the patient is diabetic or suspected to have diabetes, a hemoglobin A1c or fasting glucose can be obtained. [11]

Treatment / Management

Carbuncles typically require medical and surgical interventions. Carbuncles are usually incised and drained (I&D), in-office, and under local anesthesia. The I&D is usually performed with a #11 scalpel blade, curette, and iodoform packing strips. The #11 blade is used to make an incision into the **carbuncle** cavity and pressure is manually applied to express the purulent material within. Bacterial culture and sensitivity are usually obtained from the purulent material at this step. Next, a curette or hemostat is used to break up any loculations that may be present, and another attempt to express material is made. Once the majority of purulent material has been expelled, the lesion is typically packed with iodoform strips or gauze to assist with further drainage. The packing is typically left in place for 24 to 48 hours and then removed. [5][7][12][14]

After incision and drainage, oral antibiotics are typically initiated; this is of particular importance if the patient has any systemic symptoms or if there is any surrounding cellulitis. Common first-line oral antibiotics include dicloxacillin and cephalosporins. If MRSA is suspected or cultured, oral antibiotics such as clindamycin, tetracyclines, trimethoprim-sulphamethoxazole, linezolid, or glycopeptide may be used. Oral antibiotics can be further adjusted once bacterial culture sensitivities are known. [5][7][12][14]

Topical antibiotics such as clindamycin or mupirocin may be used as adjunctive therapy. [11] Once the **carbuncle** has receded, it usually does not require further treatment. However, in recurrent or refractory cases, the lesion may need to be surgically excised. [11]

In patients with recurrent carbuncles, prophylactic measures may be taken. This includes having patients bath with a benzoyl peroxide wash or antibacterial soap and attempting to decolonize the patient's nares. [11] Staphylococcal decolonization of the nares can be accomplished by applying mupirocin twice daily to the inner nares for 12 to 30 days. [5][11]

Differential Diagnosis

The differential diagnosis for **carbuncle** includes cystic acne, hidradenitis suppurativa, cellulitis, osteomyelitis, orf, anthrax, and arthropod bite. [5][6][13] Cystic acne lesions are typically smaller than carbuncles and have only one pustule, if any, on the surface. Hidradenitis suppurativa usually only present in the axilla or groin regions and is more chronic. Cellulitis typically does not have any pustules and is not nodular. Osteomyelitis is more common overlying a joint and may be ruled out with imaging such as MRI. Orf is a self-limited viral infection and classically goes through 6 stages: umbilicated, targetoid, weeping nodule, regenerative, papillomatous, and regressive. Additionally, orf usually occurs in those handling sheep or other farm animals. Cutaneous anthrax typically involves farm animal or bioterrorist exposure. Cutaneous anthrax lesions classically develop an overlying black eschar. Arthropod bites usually occur in multiples and would be more acute. [5][6][13]

Prognosis

A **carbuncle** develops over several days to several weeks, reaching a diameter of 2 to 10 cm. After approximately one week, multiple pustules develop and protrude from the surface. The lesion drains a serosanguinous fluid. Healing occurs over several weeks and will result in a scar. Rarely, if left untreated, mortality can occur from sepsis or diabetic ketoacidosis in those with comorbid conditions or immunosuppression. With proper treatment, carbuncles are cured, and the prognosis is excellent, resulting in only a cosmetic scar. [9][12]

Complications

Potential complications from carbuncles include septicemia, cavernous sinus thrombophlebitis (rare), and scar.[5] Other complications that may occur from **carbuncle** treatment include allergic response to antibiotic therapy, bleeding or nerve damage from I&D, and scar.[5][9]

Deterrence and Patient Education

Patients require education on the deterrence of carbuncles, including practicing good hygiene, weight loss, good diabetic control, proper nutrition, and adequate treatment of any underlying diseases or immunodeficiency. Furthermore, staphylococcal decolonization of the nares can be accomplished by applying mupirocin twice daily to the inner nares for 12 to 30 days.[5][11]

Enhancing Healthcare Team Outcomes

Carbuncles typically present as an erythematous, tender, inflamed, fluctuant nodule with multiple draining sinus tracts or pustules on the surface. Most patients with a **carbuncle** will present to the emergency room, family physician office, or a dermatology practice. All of these entities encompass both physicians and nurses; thus, interprofessional communication is imperative to optimize outcomes.

Carbuncles have a predilection for individuals with a compromised skin barrier. Thus, maintaining a healthy skin barrier can reduce incidence and recurrence. In any hospital or long-term care facility, nurses often play a vital role in maintaining a patient's skin health. This includes applying daily moisturizers, bathing, wound dressing, and administering oral and topical medications. Therefore, physicians must give nurses clear instructions for proper patient skincare to reduce the incidence and recurrence of carbuncles. To encourage standardization and promote understanding, physicians and organizations can implement the usage of skincare algorithms. An example is an algorithm for dry skin to be used by nurses when caring for patients. If a patient's skin is dry, frequent bathing/washing should be avoided, and exposure to water should be minimized. Additionally, lipophilic products should be applied daily. With the use of algorithms for patient's skincare, the number of skincare products will be reduced, and the skincare approach standardized, leading to a reduction in errors and improvement in outcomes.[15] [Level 3]

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Figures



Illustration of a **carbuncle**. Contributed by Katherine Humphries

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