1. Deune2009 (truncated)

Website: Medscape Reference ***Drug, Diseases & Procedures***

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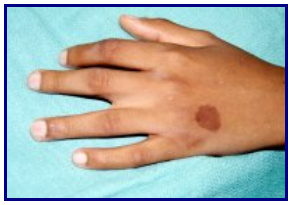
Background

Syndactyly is the most common congenital malformation of the limbs, with an incidence of 1 in 2000-3000 live births.[1, 2] Syndactyly can be classified as simple when it involves soft tissues only and classified as complex when it involves the bone or nail of adjacent fingers. It is a shared feature of more than 28 syndromes, including Poland, Apert, and Holt-Oram syndromes. Syndactyly is a failure of differentiation in which the fingers fail to separate into individual appendages. This separation usually occurs during the sixth and eighth weeks of embryologic development. The root words of the term syndactyly are derived from the Greek words *syn,* meaning together, and *dactyly,* meaning fingers or digits.

Classification

Classification of syndactyly is based on the severity of the clinical presentation.

- The mildest form is simple syndactyly, which refers to fingers joined only by soft tissue.
- Incomplete simple syndactyly is when the soft-tissue union is only partial and does not extend to the fingertips (see images below).



Dorsal view of a hand demonstrating simple incomplete syndactyly between the left long finger and ring finger. Note the incidental café-au-lait spot.

Palmar view of hand with syndactyly. The level of the syndactyly, just

proximal to the proximal interphalangeal (PIP) joint, can be clearly seen on the palmar view.

- When the soft tissue union extends to the fingertip, the condition is referred to as complete simple syndactyly (see images below). Dorsal view of the hand of a 1-year-old child with a complete simple syndactyly. Note that both the long finger and the ring finger have distinct nail plates with a trough separating them.  Palmar view of the hand of a 1-year-old child with a complete simple syndactyly.
- Complex syndactyly refers to fingers joined by bone or cartilaginous union, usually in a side-to-side fashion at the distal phalanges.
- The most severe form is classified as complicated syndactyly, which refers to fingers joined by bony fusion other than a side-to-side fashion and can include bony abnormalities, such as extra, missing, or duplicated phalanges and abnormally shaped bones, such as delta phalanges (see image below). Abnormalities in the musculotendinous and neurovascular structures may also be present. Radiograph of the left hand of a patient with Apert syndrome (type III). Note the complicated syndactyly with osseous union in the distal phalanges of all the fingers. Symphalangism is present between the proximal and middle phalanges, without the formation of a proximal interphalangeal (PIP) joint in the ring, long, and index fingers.

In simple syndactyly, the third web space between the long finger and the ring finger is the area most commonly involved, followed by the fourth, second, and (rarely) first web spaces. Bilateral involvement is found in 50% of patients. Syndactyly can be an isolated finding, or it can be found in association other abnormalities, such as polydactyly, cleft hands, ring constrictions, or craniofacial syndromes (e.g., Apert syndrome).[3]

Associated syndromes

Syndactyly often can be associated with other syndromes, particularly the craniofacial syndromes, of which Apert syndrome is the best known. Another syndrome is Poland syndrome, in which the pectoralis muscle abnormality is found in association with symbrachydactyly and/or other anomalies of the ipsilateral upper extremity.[4] Constriction band syndrome can be associated with syndactyly, but the etiology of the syndactyly is different.

Apert syndrome

Apert syndrome, or acrocephalosyndactyly, is a rare anomaly, occurring in 1 per 160,000-200,000 live births.[5, 6] Besides the characteristic facial anomalies of Apert syndrome, it is also defined by the associated upper- and lower-limb anomalies. The anomalies in the hands are mirror images of each other and are characterized by the following 4 common features: (1) radial deviation of a short thumb as a result of an abnormally shaped proximal phalanx (ie, delta phalanx); (2) complex syndactyly of the index, long, and ring fingers; (3) symbrachyphalangism of the central segments of the index, long, ring, and small fingers; and (4) simple syndactyly of the web space between the ring and small fingers. The web space between the thumb and the index finger is variable, and the extent of syndactyly at this web space serves as the basis for the classification of Apert syndactyly into 3 types:

- Type I is the most common and the least severe of the three types. The thumb is foreshortened and associated with a radial clinodactyly as a result of a delta phalanx of the proximal phalanx. Although it is separate from the index finger, the first web space is shallow. A complex syndactyly includes the index, long, and ring fingers because of osseous or cartilaginous union of the distal phalanges. Simple syndactyly of the small and ring fingers is present; this syndactyly may be complete or incomplete. The distal interphalangeal joint of the small finger is well formed and functional. Type I hands are often referred to as spade hands (see images below). Dorsal view of hand of a 6-month-old patient with type I Apert syndrome. Note that the thumb is separate. Radial view of hand of a 6-month-old patient with type I Apert syndrome. The index fingernail is separate, and the syndactyly is complete. The small fingernail is also separate from the rest of the hand. A simple syndactyly between the small finger and the rest of the hand is present. Note that the broad thumb and the abnormal curvature of the thumb is due to the presence of a delta phalanx seen in the x-ray below. Radiograph of hand of the 6-month-old patient with type I Apert syndrome demonstrates the distinctive characteristics of Apert

syndrome. In the small finger, the distal interphalangeal (DIP) is formed. Although a rudimentary proximal interphalangeal (PIP) joint is present, clinically this joint is stiff. In the ring, long, and index fingers, no PIP joint is present, and symphalangism is present between the middle and the proximal phalanges. The distal phalanges of the ring and long finger are fused. In the thumb, the proximal phalanx is shaped abnormally and is referred to as the delta phalanx. Synostosis of the ring and the small finger metacarpals is present.

- Type II is more severe and is characterized by a simple incomplete or complete syndactyly of the thumb with the index ray, without any osseous union. The thumbnail matrix remains separate from the index fingernail. The hand has a large, concave palm. The bony union of the distal phalanges of the index, long, and ring fingers are more extensive than in type I. The ring finger–small finger syndactyly remains simple but complete. Type II hands have been referred to as mitten hands or spoon hands (see image below). Apert type II hand. Note the complete syndactyly between the ring and the small fingers. The patient's hand was complicated by a chronic paronychia and skin maceration preoperatively.
- Type III is the most severe form and, fortunately, the least common. A tight osseous or cartilaginous union is present between all 5 fingers. All 5 nailplates are conjoined, and they sometimes have longitudinal ridges, which indicate separate underlying distal phalanges. The thumb is indistinguishable from the index ray. The small finger, although joined by a common fingernail, does not have an osseous union at the distal phalanx and remains a simple but complete syndactyly. Usually, metacarpal synostosis of the small and ring finger rays is present. Type III hands have been termed rosebud or hoof hands (see first 2 images below). Radiographs are difficult to obtain and interpret because of the overlap of osseous structures (see third image below).[5] Apert syndrome (type III), dorsal view. Apert syndrome (type III), volar view. Radiograph of the left hand of a patient with Apert syndrome (type III). Note the complicated syndactyly with osseous union in the distal phalanges of all the fingers. Symphalangism is present between the proximal and middle phalanges, without the formation of a proximal interphalangeal (PIP) joint in the ring, long, and index fingers.

As stated, the goal of treating complex syndactyly is the surgical release of the fingers to increase the functionality of the hand. Timing of the surgery is critical because the child requires multiple operations for other abnormalities of the cranium, midface, and orbits associated with Apert syndrome.

Poland syndrome

Poland syndrome is a sporadic congenital anomaly characterized by the absence of the sternal head of the pectoralis major muscle, along with hypoplasia and/or aplasia of the breast or nipple, with deficiency of the subcutaneous fat and axillary hair. There can be associated abnormalities of the rib cage and the ipsilateral upper extremity. It was first described by Alfred Poland in 1841 as a medical student, when he reported the absence of the sternocostal portion of the pectoralis major muscle during a cadaver dissection. In the hand and fingers, anomalies include symphalangism, syndactyly with hypoplasia, brachydactyly, or aplasia of the fingers. Two variations of hand anomalies with syndactyly in patients with Poland syndrome can be seen in images below.

Poland Syndrome: Dorsal view of a left hand in a patient with Poland Syndrome with brachydactyly (short fingers) and adactyly (missing fingers) with associated simple incomplete syndactyly between the ring and the small finger Volar view of the preceding hand in a patient affected with Poland syndrome. Right hand of a patient with Poland syndrome. Note the incomplete syndactyly between the hypoplastic right index and long fingers. Volar view of the index and long finger in incomplete syndactyly in a patient with Poland syndrome.

Constriction band syndrome

The syndactyly found in constriction band syndrome (also known as amniotic band syndrome) is not the result of failure of differentiation during embryogenesis. In this condition, the fingers are already formed, and because of the injuries due to the constricting amniotic bands, the fingers heal together at the site of injury, causing postinjury syndactyly.[7] The extent of involvement may be mild, with only a rudimentary small skin bridge connecting the 2 fingers (see images below).

Dorsal view of the right hand of a 1.5-year-old patient with constriction band syndrome. The fingers can still be identified individually. Note the presence of a fistula tract between the affected fingers, particularly between the long finger and ring finger. Palmar view of the right hand of a 1.5-year-old patient with constriction band syndrome. The fingers can still be identified individually. Note the presence of a fistula tract between the affected fingers, particularly between the long finger and ring finger. Right hand of a 1.5-year-old patient with constriction band syndrome. Radiograph demonstrates that the level of the amputation

occurred at the proximal interphalangeal (PIP) joints. The extent of involvement may be more severe, with a complete soft-tissue fusion in association with amputated fingers (see images below).

Dorsal view of left hand of a 1.5-year-old patient with constriction band syndrome. The left hand is more severely involved than the right, with all of the fingers being nearly indistinguishable from one another. Note the presence of pits between the fingers where normal webs would be. The most prominent one is between the ring and the small fingers. They often represent fistulas between the dorsal and the volar surface of the hand and are often the only thing remaining of the previous normal web space. Volar view of left hand of a 1.5-year-old patient with constriction band syndrome. The left hand is more severely involved than the right, with all of the fingers being nearly indistinguishable from one another. Note the presence of a prominet fistula between the small finger and ring finger. Radiograph of left hand of a 1.5-year-old patient with constriction band syndrome. The level of amputation is through the midportion of the proximal phalanges of the involved fingers.

Occasionally, epithelialized sinuses or fistula tracts can be found usually proximal to the level of the syndactyly (see images below). The finger distal to the constriction ring is usually atrophic, or it has been amputated in utero as a result of ischemia. These findings in the fingers may be isolated or in association with other constrictions on the proximal arm, leg, or face.

Dorsal view of the right hand of a 1.5-year-old patient with constriction band syndrome. The fingers can still be identified individually. Note the presence of a fistula tract between the affected fingers, particularly between the long finger and ring finger. Palmar view of the right hand of a 1.5-year-old patient with constriction band syndrome. The fingers can still be identified individually. Note the presence of a fistula tract between the affected fingers, particularly between the long finger and ring finger. Right hand of a 1.5-year-old patient with constriction band syndrome. Radiograph demonstrates that the level of the amputation occurred at the proximal interphalangeal (PIP) joints. If the syndactyly is minimal, standard techniques and skin grafts may be used to release the syndactyly (see image below).

Image of the left hand of a 1.5-year-old patient with constriction band syndrome after a second reconstructive procedure following release of the second and fourth web spaces. The syndactyly partially recurred because of a skin-graft loss. During the second-stage operation to separate the long finger and ring finger, the recurrence in the second and fourth web spaces were re-revised. Thus, sutures are present on both sides of the ring finger and long finger. If sinus tracts or fistulas exist within the syndactyly, these tracts can often be released to reveal epithelialized web spaces, which do not require skin grafts (see image below). The markings made prior to the syndactyly then require modification.

Palmar view of the right hand of a 1.5-year-old patient with constriction band syndrome after a previously staged syndactyly release. No skin graft was needed for the release between the long and ring fingers. The patient also underwent revision of the web space between the index and long fingers.

Problem

Unreleased syndactyly can significantly impair finger and hand function. The impairment is worse when the syndactyly is complete, is complex, or involves the border digits with fingers of uneven lengths, such as the ring and small fingers or the thumb and index finger (see images below).

Complete simple syndactyly of the ring and small fingers. Note the ring finger proximal interphalangeal (PIP) joint flexion deformity due to the complete syndactyly between the border digits. Complete simple ring and small finger syndactyly. Note the ulnar deviation of the ring finger due to the syndactyly of the small finger.

Epidemiology

Frequency

Syndactyly is the most common congenital abnormality of the hand, with a rate of 1 per 2000-3000 births.[8, 9, 10, 11] The male-to-female ratio is 2:1.

Etiology

Approximately 10-40% of cases are familial with variable penetrance. Syndactyly can occur as part of a syndrome or as sporadic events that are nonhereditary and nonsyndromic. One report indicates that there is an

association of syndactyly with smoking during pregnancy.[12]

Presentation

Although many patients with syndactyly have been evaluated by multiple specialists and referred by their primary care pediatrician, the hand surgeon should also obtain a thorough prenatal, postnatal, and familial history. In addition to the hand being examined, the cranium, face, torso, and lower extremities should be examined for anomalies.

The hand evaluation should proceed systematically.

- Note and document the number of digits present, the level of web involvement, the length of the finger, and the appearance of the fingernails.
- Often, photographing or drawing a picture of the hands during the initial visit is helpful.
- Passively move the fingers to determine bony union; differential motion occurs only if no underlying bony union is present. Fusions of the fingernails often are associated with bony union, and a broad fingernail also may indicate a hidden polydactyly.
- The extent of anomaly of tendons and neurovascular structures reflects the complexity of the syndactyly. In a simple complete or a complex syndactyly involving only the distal phalanx, the underlying tendon and neurovascular structures are usually normal. However, in an individual with brachysyndactyly or complicated syndactyly, the bifurcation of the nerves and digital vessels may be located more distally, or only one side may be present.
- Always obtain radiographs to help identify any other anomalies, such as bony synostosis, a delta phalanx, or symphalangism.

Indications

In itself, a minor incomplete syndactyly is not an indication for surgery if the only issue is its incongruous appearance. However, a syndactyly that prevents full range of motion in the involved fingers warrants surgical release to increase functionality of the fingers. (see images below). As with any operation, exceptions to the rule exist (see Contraindications).

- Complete simple syndactyly of the ring and small fingers. Note the ring finger proximal interphalangeal (PIP) joint flexion deformity due to the complete syndactyly between the border digits.
- Complete simple ring and small finger syndactyly. Note the ulnar deviation of the ring finger due to the syndactyly of the small finger.

Contraindications

In individuals with complex syndactyly in whom the conjoint fingers together are functional but individually hypoplastic, separation of the conjoint fingers may make the 2 individualized digits nonfunctional, because only 1 set of tendons and 1 neurovascular pedicle may be present. Carefully consider this possibility in those few individuals who have complex syndactyly. Otherwise, most patients with syndactyly benefit from surgical release.

Imaging Studies

- Obtain radiographs of the hands to evaluate for any other bony anomalies, such as synostosis, delta phalanx, or symphalangism. Diagnostic Procedures

If the infant has no associated medical conditions, a formal preoperative evaluation by the anesthesia team is usually not necessary. However, should there be any congenital syndromes or associated medical conditions, the patients should be scheduled for operative clearance with the preoperative evaluation service of the hospital where the surgery will be done. Generally, if there is no issue with postoperative monitoring, many of these cases can be handled as outpatient procedures.

Medical Therapy

Syndactyly requires surgical intervention. Full-term infants can be scheduled for elective surgical procedures as early as 5 or 6 months of age. Surgery before this age can increase anesthetic risks. Prior to that time, there is generally no intervention necessary if there are no problems. If there is an associated paronychia (see image below), which can occur with complex syndactyly, the parents are given instructions to wash the child's hands thoroughly with soap and water and to apply a topical antibacterial solution or ointment. Oral antibiotics are given when indicated.

- Paronychia in a patient with Apert syndrome. Despite the use of oral antibiotics and topical antibiotic

2. Marinkovich2008 (truncated)

http://emedicine.medscape.com/article/1062939-overview#showall or *http://www.brts.pwp.blueyonder.co.uk/case_ai001.htm*

Epidermolysis Bullosa

site: Giovani Maria Gaeta

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Updated: Nov 12, 2008

Introduction

Background

Epidermolysis bullosa (EB) is a group of inherited bullous disorders characterized by blister formation in response to mechanical trauma. Historically, EB subtypes have been classified according to skin morphology. Recent discoveries of the molecular basis of EB have resulted in the development of new diagnostic tools, including prenatal and preimplantation testing. Based on a better understanding of the basement membrane zone (BMZ) and the genes responsible for its components, new treatments (eg, gene or protein therapy) may provide solutions to the skin fragility found in patients with EB.Related eMedicine articles include Epidermolysis Bullosa Acquisita and Epidermolysis Bullosa (pediatrics version). Additionally, the Medscape Genomic Medicine Resource Center may be of interest.

Pathophysiology

EB is classified into 3 major categories, including (1) EB simplex (EBS; intraepidermal skin separation), (2) junctional EB (JEB; skin separation in lamina lucida or central BMZ), and (3) dystrophic EB (DEB; sublamina densa BMZ separation; see Media Files 5-6). Researchers have proposed a new category termed hemidesmosomal EB (HEB), which produces blistering at the hemidesmosomal level in the most superior aspect of the BMZ. EBS usually is associated with little or no extracutaneous involvement, while the more severe hemidesmosomal, junctional, and dystrophic forms of EB may produce significant multiorgan system involvement.1,2 Significant progress has been achieved in finding specific molecular therapies for EB, including protein and gene therapy. Type VII collagen and laminin-5 gene therapy have been proven effective through in vivo models. Type VII collagen protein therapy has similarly been shown to be effective in an in vivo model. Currently, these therapies are being extensively studied at the preclinical stage, in animal models.

Frequency

United States

Assuming that mild cases of EBS are reported only 10% of the time, the affected population in the United States is approximately 12,500 persons. According to a National Epidermolysis Bullosa Registry report,3 50 EB cases occur per 1 million live births. Of these cases, approximately 92% are EBS, 5% are DEB, 1% are JEB, and 2% are unclassified. Patients with HEB probably constitute much less than 1% of total EB cases.

International

According to the National Epidermolysis Bullosa Registry,3 the number of EB cases in Norway is 54 cases per million live births, in Japan is 7.8 cases per million live births, and in Croatia is 9.6 cases per million live births.

Mortality/Morbidity

Infancy is an especially difficult time for EB patients. Generalized blistering caused by any subtype may be complicated by infection, sepsis, and death. Severe forms of EB increase the mortality risk during infancy. Patients with the Herlitz or letalis form of JEB have the highest risk during infancy with an estimated mortality rate of 87% during the first year of life. In patients with EB that survive childhood, the most common cause of death is metastatic squamous cell carcinoma (SCC) (see Media File 9). This skin cancer occurs specifically in patients with recessively inherited EB (RDEB) who most commonly are aged 15-35 years. In contrast, dominantly inherited EBS and DEB and milder forms of JEB may not affect a patient's life expectancy adversely.

Age

Onset of EB is at birth or shortly after. The exception occurs in mild cases of EBS, which may remain undetected until adulthood or occasionally remain undiagnosed.

Clinical

History

Important general points include age of onset; size, frequency, and location of blisters; possible inciting factors; prior diagnostic attempts; prior therapies; and extent of pain or pruritus. Review of systems information that can

- Dominantly inherited DEB: The onset of disease usually is at birth or during infancy, with generalized blistering as a common presentation. With increasing age, an evolution to localized blistering is present. A common variant described by Cockayne-Touraine has an acral distribution and minimal oral or tooth involvement. Another variant described by Pasini features more extensive blistering, scarlike papules on the trunk (termed albopapuloid lesions), and involvement of the oral mucosa and teeth. Dystrophic or absent nails are common in both of these dominantly inherited DEB variants.

RDEB: This group of diseases ranges from mild to severe in presentation.

- A localized form, termed RDEB mitis, often involves acral areas and nails but shows little mucosal involvement. This subtype also demonstrates clinical manifestations similar to the dominantly inherited forms of DEB.

Severe RDEB, as described by Hallopeau-Siemens, usually shows generalized blistering at birth and subsequent extensive dystrophic scarring that is most prominent on the acral surfaces. This can produce pseudosyndactyly (mitten-hand deformity) of the hands and feet (see Media File 7). Flexion contractures of the extremities are increasingly common with age. Nails and teeth also are affected. Involvement of internal mucosa can result in esophageal strictures and webs, urethral and anal stenosis, phimosis, and corneal scarring. Malabsorption commonly results in a mixed anemia resulting from a lack of iron absorption, and overall malnutrition may cause failure to thrive (see Diet). Patients with severe RDEB who survive to childhood are at significant risk of developing aggressive SCC in areas of chronic erosions.

- Ectodermal dysplasia-skin fragility syndrome: This is a rare disorder characterized by skin erosions, skin fragility and peeling beginning at birth or infancy that may be accompanied by alopecia, palmoplantar keratoderma, painful fissures, and nail dystrophy. Failure to thrive, cheilitis, hypohidrosis, and pruritus are other potential complications. The underlying molecular defect has been shown to be loss of function of the desmosomal protein plakophillin 1. Plakophillin is expressed mainly in suprabasilar keratinocytes and outer root sheath cells. Microscopic findings in this disease usually show intraepidermal acantholysis, located in the areas where plakophillin 1 is normally expressed. The molecular defect involves loss of function mutations in the PKP1 gene coding for plakophillin 1.4

Causes

Many stratified squamous epithelial tissues, such as the skin and oral mucosa, contain a complex BMZ. The BMZ is composed of many specialized components that combine to form anchoring complexes. At the superior aspect of the BMZ, keratin-containing intermediate filaments of the basal cell cytoskeleton insert on basal cell plasma membrane condensations termed hemidesmosomes. Anchoring filaments extend from the basal cell plasma membrane into the extracellular environment and span the lamina lucida, connecting hemidesmosomes with the lamina densa. At the most inferior aspect of the BMZ, type VII collagen-containing anchoring fibrils extend from the lamina densa into the papillary dermis, connecting the lamina densa to anchoring plaques, trapping interstitial collagen fibrils. Thus, the cutaneous BMZ connects the extensive basal cell cytoskeletal network with the abundant network of interstitial collagen fibrils in the dermis.

- Keratin filaments: Keratins 5 and 14 combine to form intermediate filaments in basal keratinocytes. Keratins contain a central alpha-helical rod with several nonhelical interruptions, as well as nonhelical carboxyterminal and aminoterminal regions. The regions of highest conservation between the keratins are located on the ends of the keratin rod in the helix boundary motifs. Keratin intermediate filaments insert upon electron-dense structures termed hemidesmosomes.

Hemidesmosomes: These structures contain intracellular proteins, including plectin and BP230. Plectin (HD1) is a 500-kd protein that binds intermediate filaments. BP230, also termed BPAG1, is a 230-kd protein that has homology to both desmoplakin and plectin. BP230, like plectin, functions in the connection between hemidesmosomes and intermediate filaments. Hemidesmosomes also contain the intracellular portions of the transmembrane proteins collagen XVII (BP180) and a 6 b 4 integrin. The b 4 integrin subunit performs a central role in hemidesmosome formation and contains an especially large cytoplasmic domain, which interacts with other proteins of the hemidesmosomal plaque. Collagen XVII is a transmembrane collagenous protein that interacts with b 4 integrin and BP230 intracellularly and with laminin 5 extracellularly.

Anchoring filaments: These structures contain the extracellular portions of collagen XVII (BP180) and a 6 b 4 integrin. In addition, anchoring filaments contain the molecules laminin 5 and laminin 6. Similar to all members of the family of laminin proteins, laminin 5 is a large heterotrimeric molecule, containing a 3, b 3, and g 2 chains. Laminin 5 forms a disulfide-bonded attachment to laminin 6, the other known anchoring filament laminin, which contains a 3, b 1, and g 1 chains. Laminin 5 also forms a strong association with type VII collagen, which serves to connect anchoring filaments with anchoring fibrils.

Anchoring fibrils: Type VII collagen is the primary component of anchoring fibrils. Type VII collagen contains a large N-terminal globular domain (NC-1), which interacts with laminin 5 in the lamina densa; a long collagenous

- GI management: Esophageal dilation has been helpful in relieving strictures. Removal of esophageal strictures by colonic interposition has proved effective in cases of advanced disease. Gastrostomy tube insertion has been effective in providing nutrition to individuals with esophageal strictures.

Surgical restoration of the hand: Mitten deformity of the hand occurs frequently in patients with the Hallopeau-Siemens DEB subtype. Repeated episodes of blistering and scarring eventually result in fusion of the web spaces. As a result, fine manipulative skills and digital prehension are lost. Surgical procedures can correct this deformity, but a high rate of recurrence is seen with mitten pseudosyndactyly. Typically, the dominant hand has earlier recurrence. Recurrence appears to be delayed by the prolonged use of splinting in the interphalangeal spaces at night.

Surgical excision of SCC: Invasive aggressive SCC is a particularly troubling complication of RDEB. When detected, excision of the carcinoma is indicated. Both Mohs and non-Mohs surgical approaches have been used.

Endotracheal tube placement: Perform this procedure with extra care in patients with EB. Optimally, consult an anesthesiologist experienced in the care of patients with EB.

Skin equivalents: Human keratinocytes cultured atop dermal equivalents are commercially available; they have been useful in facilitating healing of erosions in persons with EB and in improving the overall quality of life of these patients. These are allografts, in that the cells do not derive from the patient themselves but from another unidentified donor. These allografts are eventually rejected by immunocompetent hosts such as patients with EB. However, before they are rejected, they are believed to produce cytokines that facilitate the wound healing process and stimulate reepithelialization of the patients' wounds. Skin equivalent therapy represents an effective short-term therapy for treating chronic nonhealing wounds associated with EB. Claims that allografts produce a permanent cure for EB are unsubstantiated.

Consultations

Genetic counseling

- Genetic information provided by mutation analyses on EB candidate genes provides an immediate benefit to families of patients with EB. Siblings of a patient identified as a proband with recessively inherited EB that are considering children often want to know whether they carry the mutant allele.

Most importantly, prenatal diagnosis of EB in affected families currently is a genetic-based protocol, providing that the patient identified as the original proband has had mutational analysis or identification of the defective gene. Currently, fetal skin biopsies and fetoscopy, with their increased risk of pregnancy loss, can be avoided by analyzing either a chorionic villus sample as early as 8-10 weeks or amniotic fluid in the second trimester. The development of highly informative intragenic and flanking polymorphic DNA markers in EB candidate genes, together with rapid screening of genetic hotspots, make genetic screening of high-risk pregnancy a viable option. Preimplantation diagnosis has also been performed in EB cases.

Diet

Nutritional management

- Increased needs: Extensive cutaneous injury is associated with marked alterations in both hemodynamic and metabolic responses, requiring increased caloric and protein intake for recovery. The burn patient has been studied extensively from both of these perspectives. Studies confirm that the development of nutritional deficiencies inhibits successful wound healing and the body's return to a normal hemodynamic and metabolic profile.

Impediments to intake and absorption: Oropharyngeal and GI lesions greatly threaten the nutritional well being of patients with EB. Complications include oral blistering, abnormal esophageal motility, strictures, dysphagia, diarrhea, malabsorption, and dental problems. Nutritional assessment taking these factors into account is essential for replenishing the malnourished patient.

Activity

- Inactivity as a result of pain and scarring can cause contractures to form. Physical therapy can be helpful in reducing limb and hand contractions and in maintaining the range of motion.

Medication

Epidermolysis bullosa (EB) is a genetic disease and no drugs are known to correct the underlying molecular defects. Prolonged use of steroids is contraindicated in the treatment of inherited forms of EB. Steroid-induced complications further warrant prohibiting their use. No other drugs, including phenytoin and tetracycline, have improved the blistering or epithelial disadhesion in EB significantly or consistently.

3. Dao2004

J Am Acad Orthop Surg. 2004 Jan-Feb;12(1):39-48.

Surgical treatment of congenital syndactyly of the hand.

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Abstract
Syndactyly is a congenital anomaly of the hand that is more common in males, is present bilaterally in 50% of affected patients, and often is associated with other musculoskeletal malformations or systemic syndromes. The goal of syndactyly release is to create a functional hand with the fewest surgical procedures while minimizing complications. For simple syndactyly, surgical reconstruction can begin at approximately 6 months, although many surgeons prefer to wait until the infant is 18 months old. Special situations, such as complex syndactyly and involvement of border digits, may warrant surgical intervention earlier than 6 months. Reconstruction of the web commissure is the most technically challenging part of the operation, followed by separation of the remaining digits. Full-thickness skin grafting is almost always required for soft-tissue coverage. Complex syndactyly and syndactyly associated with other hand anomalies warrant special consideration. After reconstruction, patients should be examined periodically until they have achieved skeletal maturity because late complications such as web creep can occur.

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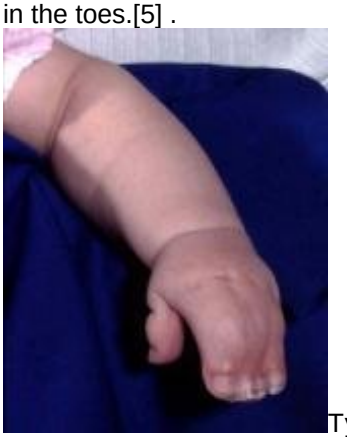
Crouzon, Apert, Pfeiffer, Saethre-Chotzen, and Carpenter Syndromes

Crouzon Syndrome
Crouzon syndrome was first described in 1912.
Inheritance
Inheritance is autosomal dominant with virtually complete penetrance. It is caused by multiple mutations of the

Apert Syndrome

In nearly all patients with Apert syndrome, the cause is 1 of 2 FGFR2 mutations involving amino acids (Ser252Trp, Pro253Arg). The condition is inherited in an autosomal dominant mode. Craniosynostosis is present, characterized by brachycephaly and, frequently, turricephaly; the anterior fontanelle is enlarged.[4] The maxilla is hypoplastic with a high-arched palate, class III malocclusion with an anterior open bite, and, frequently, a cleft of the soft palate. The mid face is hypoplastic. This, together with the retrusion, causes exorbitism.

Complex syndactyly of the hands and feet is present. It is symmetric, and other limb anomalies (eg, shortening) may be observed. The syndactyly may show fusion of the second and forth fingernails, which also may be seen in the toes.[5] .



Typical Apert syndrome hand with syndactyly of all fingers. The thumb has been freed surgically. Upper eyelid ptosis with an antimongoloid slant may be seen. Blindness may be present. Overall, the deformity is worse than that of Crouzon syndrome.

The classic features of Apert syndrome, including the broad skull, bulging in the temporal area, and retrusion and vertical shortening of the maxilla.

Pfeiffer Syndrome

This is an autosomal dominant condition caused by a single recurring mutation (Pro252Arg) of the FGFR1 gene and several mutations involving FGFR2. Patients have craniosynostosis, enlarged thumbs and great toes, and a hypoplastic mid face. The hypoplastic mid face gives the forehead an enlarged appearance. The nose is small. Exorbitism may be present, but it is never as prominent as in persons with Crouzon or Apert syndrome. The condition has been classified into 3 types. Patients with type I have the best long-term prognosis, whereas those with types II and III have neurologic compromise and die young.[6]

Saethre-Chotzen Syndrome

This is an autosomal dominant condition with full penetrance. It is caused by multiple mutations of FGFR2. Craniosynostosis is present, and the hairline is low. Ptosis and brachydactyly are characteristic. The forehead is retruded, giving the appearance of slight exorbitism. The maxilla may or may not be retruded.

Carpenter Syndrome

Patients with this autosomal recessive condition have craniosynostosis, syndactyly of the feet, and short hands and fingers with syndactyly of varying degrees.

Treatment of Craniosynostosis Syndromes

This collection of syndromes has proved to be an exciting area of investigation for plastic surgeons and other