CUTANEOUS TUBERCULOSIS
Cutaneous tuberculosis

• Laennec (1826) – prosector’s wart
• Demme (1883) – demonstrated *Mycobacterium tuberculosis* in lupus vulgaris.
• Neil Finsen won the Nobel Prize in medicine in 1903 for introducing UV light into the treatment of skin TB.
Epidemiology

• Frequency –
  ❖ Worldwide- 0.1-2.6% *
  ❖ India- 0.11-2.5% *
• Age- mostly in first 3 decades of life #
• Sex- M:F = 1.35:1 #

# Cutaneous Tuberculosis' ,Monte S Meltzer et al, emedicine , nov 20,2006
Causative micro-organisms

- *Mycobacterium tuberculosis*
- *Mycobacterium bovis*
- *Mycobacterium africanum*
- *Mycobacterium microti*
- Atypical mycobacteria

'Cutaneous Tuberculosis', Monte S Meltzer et al, emedicine, nov 20, 2006
Histology of normal skin

Cutaneous tuberculosis

- A typical tubercle consists of an accumulation of
- epitheloid cells,
- surrounded by a wall of lymphocytes,
- few Langhans giant cells,
- Caseation in centre.

**FIGURE 21-13.** Tuberculosis. A prosector's wart following inoculation of the finger from a tuberculous cadaver. There is central caseation necrosis with dense macrophage and lymphocyte surround (H&E stain).
<table>
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<td>Tuberculous chancre</td>
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<tr>
<td>Warty tuberculosis</td>
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<td><strong>Tuberculids</strong></td>
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<tr>
<td>Probable tuberculids</td>
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<tr>
<td>Papulonecrotic tuberculid</td>
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<td>Lichen scrofulosorum</td>
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<td>Possible tuberculids</td>
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<tr>
<td>Erythema induratum</td>
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<td>Erythema nodosum</td>
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<tr>
<td>Former tuberculids</td>
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<tr>
<td>Lupus miliaris disseminatus facei</td>
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<td>Rosacea-like tuberculid</td>
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<td>Lichenoid tuberculid</td>
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Primary cutaneous TB

Previously uninfected individual

- cutaneous inoculation of tubercle bacilli
- 8-12 days = a hard nodule develops
- Nodule ulcerates and regional lymphadenopathy
- 10-14 days = predominantly polymorphonuclear cells
- 3-4 wks = lymphocytes and epitheloid cells appear.
Tuberculous chancre

- At the site of inoculation
- In a previously non-sensitized host
- Face, extremities
- Papule/nodule → crusting & ulceration
- Shallow ulcer with granular base
Tuberculous chancre

- May heal; usually proceeds to lupus vulgaris
- Regional lymph nodes enlarge; may form discharging sinuses; scrofuloderma
- Skin biopsy-AFB can be seen in early lesions; epitheloid cell granuloma with caseation
- Tuberculin test positive
Acute miliary TB of skin

- Hematogenous dissemination of MTB
- Infants, children
- Initial focus - either pulmonary or meningeal
- May follow measles or viral exanthems
- Constitutional symptoms - severe
Acute miliary TB of skin

• On all parts of body esp. trunk, thighs, buttocks, genitalia
• Skin lesions- pustules/vesicles/papules capped by crust, on removal reveals umblication
• Heal with white depressed scar with a brownish halo
• Biopsy- focal areas of necrosis surrounded by a zone of macrophages, containing numerous tubercle bacilli
• Tuberculin sensitivity is absent
Lupus vulgaris

- Most common
- Previously sensitized host
- Following exogenous inoculation, or occasionally direct extension or lymphatic spread
- Over scar of scrofulodermata, after BCG vaccination
- Lesions show peripheral extension and central scarring
- “Apple jelly nodules”
- Face, buttocks, lower limbs
Lupus vulgaris- types

- **PLAQUE FORM-**
  - Flat plaques
  - Surface may be smooth or covered with scales
  - Central scarring
- **PAPULAR & NODULAR FORM**
Lupus vulgaris - types

- **HYPERTROPHIC**
  - Soft tumorous growths with a nodular surface or as hyperkeratotic masses
  - Edema, vascular dilatation, elephantiasis

- **ULCERATIVE**
  - Necrosis, ulceration, scarring
  - Deeper tissues and cartilage destroyed resulting in contractures and deformity
Lupus vulgaris - types

- **VEGETATING**-
- Marked infiltration, necrosis, ulceration with minimal scarring

Fig. 28.11 Vegetating lupus vulgaris on the nose. (Courtesy of Dr J.E. Bothwell, Barnsley District General Hospital, Barnsley, UK.)
Lupus vulgaris

- Longstanding lesions ➔
  ▶ squamous cell carcinoma,
  ▶ basal cell carcinoma,
  ▶ sarcomas

Fig. 28.13 Squamous cell carcinoma of the neck in a patient with lupus vulgaris of many years’ duration.
Tubercular verrucosa cutis

- Exogenous inoculation
- Previously sensitized individual
- Hands, fingers, lower extremities
- Occupational hazard for physicians, pathologists, forensic experts, farmers, butchers
Tubercular verrucosa cutis

- Asymptomatic, small solitary papule with an inflammatory areola → hyperkeratotic and warty → verrucous plaque with deep clefts and fissures.
- Pus and keratinous material can be expressed from the fissures.
- Lymphadenopathy in cases of secondary infection.
- Tuberculin test positive
Tubercular verrucosa cutis

- Skin biopsy-
  hyperkeratosis, acanthosis, papillomatosis overlying an acute inflammatory infiltrate in epidermis and microabscesses in upper dermis. Tuberculoid granuloma with moderate amount of caseation in middermis with marked fibrosis.
Scrofuloderma (colliquative TB)

- Skin lesions that develop from contiguous spread or extension of TB infection from an underlying or adjacent structure
- Primary focus- LN, bones, joints, epididymis
- Sinus with 3-5mm orifice, thin seropurulent discharge; attached to underlying structure
- Recur
Scrofuloderma

- Healed sinuses - broad atrophic scars
- Scarring and fibrosis of LN may lead to lymphoedema and elephantiasis
- Tuberculin test positive
- AFB can be demonstrated in the discharge and can be cultured

Fig. 28.6 Scrofuloderma associated with tuberculosis of the axillary glands occurring in a 74-year-old Caucasian man prior to antituberculous therapy. (Courtesy of the Editor of the British Journal of Dermatology.)
Tuberculosis Gumma

- Hematogenous spread
- Soft, subcutaneous swellings → ulcers
Tuberculosis cutis orificialis

- Inoculation of MTB from visceral infection into the skin around the draining orifices
- In perianal area or around the mouth in abdominal or pulmonary tuberculosis
- Nodule ➔ deep indolent non-healing ulcer
Tuberculosis cutis orificialis

- Biopsy from the edge of the ulcer reveals epitheloid granuloma deep in the dermis
- AFB can be demonstrated and cultured
Tuberculids

- Develop as hypersensitivity response to the presence of a tuberculosis focus elsewhere in the body

**Criteria:-**
- Skin lesion must show a tuberculoid histopathology
- MTB absent in lesions
- Tuberculin test- strongly positive
- T/t of the underlying tuberculosis focus must lead to resolution of skin lesions.
Tuberculids

• **TYPES**-
  - Lichen scrofulosorum
  - Papulonecrotic tuberculid
  - Erythema induratum
Lichen scrofulosorum

- A crop of 2-5mm erythematous papules with crusting
- Trunk
- Resolve in about 2wks-several months with hyperpigmentation
- Tuberculin test-strongly positive
- Biopsy-small epitheloid granulomas in upper dermis, around sweat glands
Papulonecrotic tuberculid

- Multiple, papulonodular lesions, 2-5cm→pustules with crust→deep ulcer
- Trunk, extremities
- Eruption preceded by fever & constitutional symptoms
- Tuberculin test strongly positive
- Biopsy-wedge shaped necrosis of the epidermis, upper dermis with underlying epitheloid granuloma

Fig. 28.16 Papulonecrotic tuberculide of the legs. (Courtesy of Professor Jamila Aboobaker, University of Natal, Durban, South Africa.)
Erythema induratum of Bazin

- Mildly tender, dull red nodules, 5-7.5cm→ deep persistent ulcers
- Posterior aspect of calves
- Granulomatous panniculitis with vaculitis of dermal vessels
Erythema nodosum

- TB is an imp cause in Indian patients
- Erythematous, tender, 2.5-5cm nodules
- Shins, thighs, buttocks, foream
- Regress spontaneously; macular hyperpigmentation
- Septal panniculitis with epitheloid cell granuloma & vasculitis
<table>
<thead>
<tr>
<th>Disease</th>
<th>Type of infection</th>
<th>PPD test</th>
<th>Immune function</th>
<th>Bacilli in biopsy</th>
<th>Common age group</th>
<th>Gender predilection</th>
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<tr>
<td>Tuberculous chancre</td>
<td>Primary</td>
<td>− (later ++ )</td>
<td>Good</td>
<td>Common</td>
<td>Children</td>
<td>—</td>
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<tr>
<td>Warty tuberculosis</td>
<td>Secondary</td>
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<td>Secondary</td>
<td>++</td>
<td>Moderate to good</td>
<td>Rare</td>
<td>Children and adults</td>
<td>Female</td>
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<td>−</td>
<td>Poor</td>
<td>Common</td>
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BCG vaccination-skin complications

- **LOCAL**
  - Keloid
  - Abnormally large ulcer
  - Subcutaneous abscess
  - Epithelial cyst
  - Granulomatous reaction
  - Lupus vulgaris
  - Warty tuberculosis

- **GENERALISED**
  - Erythema nodosum
  - Tuberculids
  - Scrofuloderma
  - Non-specific haemorrhagic eruptions
BCG vaccination complications

- *M. bovis* infection should be considered in patients with cutaneous eruptions who have received BCG vaccination, especially who are immunocompromised.

Atypical mycobacteria

• Common causes:-
  ▶ M. fortuitum-cheloneae complex
  ▶ M. hemophilum
  ▶ M. ulcerans

■ Rare causes:-
  ▶ M. avium-intracellulare
  ▶ M. kansasii
  ▶ M. scrofulaceum
M. Marinum infection

- “swimming pool granuloma”
- Nodule on arm or hand, spreads along lymphatics

Fig. 28.20 Mycobacterium marinum infection showing sporotrichoid spread from the hand to the forearm in an aquarist. (Courtesy of Dr I.H. Coulson, Burnley General Hospital, Burnley, UK.)
M. ulcerans

- Swampy areas in Australia - Bairnsdale ulcer
- Uganda and certain parts of Africa - Buruli ulcer
- Following minor trauma
- Painless

Fig. 28.21 Mycobacterium ulcerans in an 8-year-old child. (Courtesy of Professor Françoise Portaels, Institute of Tropical Medicine, Antwerp, Belgium.)
M. haemophilum

- Immununosuppressed individuals
- Nodular lesions on extremities, face and chest.

Fig. 28.26 Mycobacterium haemophilum infection producing ulcerated nodules on the left knee and shin, with a non-ulcerated nodule on the medial aspect of the knee. (Courtesy of Dr J.C. Murray, Duke University Medical Center, Durham, NC, USA, and the Editor of the British Journal of Dermatology.)
Cutaneous tuberculosis

• **Jadassohn-Lewandowsky law** – wherever micro-organisms or their products are being overcome or neutralized by the local immunologic reactions, tubercles or tuberculoid structures have a tendency to appear.
Lupus vulgaris- histology

- Skin biopsy- non-necrotizing epitheloid cell granulomas in upper dermis; thickened hyperkeratotic epidermis.
- AFB negative
- Tuberculin test positive
Scrofuloderma

- Skin biopsy- from the edge of bluish thin overhanging edge of the sinus reveals a mixed cell granuloma of epitheloid cells, histiocytes with neutrophils and eosinophils along with central caseation necrosis.

Fig. 28.7 Scrofuloderma associated with sternal tuberculosis occurring in a 62-year-old Pakistani man. (Courtesy of the Editor of the British Journal of Dermatology.)
All the best...