Penile Gangrene and Multiple Septic Embolism

Ming-Hong Kao, Yu-Chuan Lu, IN Chiang, Shuo-Meng Wang

Department of Urology, National Taiwan University Hospital, College of Medicine, National Taiwan University, Taipei, Taiwan.
A 30-year-old men with penile swelling, pain and discoloration for 5 days
Patient Profile

• Medical history
  – Recurrent condyloma for 6 months
  – Intermittent paraphimosis for 6 months
  – Gout history

• Surgical history: denied

• Regular medications
  – Oral and local herbal medication for condyloma for 6 months
Patient Profile

- Substance abuse
  - Alcohol/Smoking/betel nut: all denied
- Travel history: 2012/7~8 Singapore
- Occupation: PhD
- Contact/cluster history: denied
- Sexual history
  - Homo-sexual
  - Deny un-protective sex
Present illness

- **2010/04**
  - Close contact with HIV(+) person
  - Deny unprotected sex
  - HIV screening test & RPR: negative

- **2011/03**
  - HIV counseling
  - HIV screening test & RPR: negative

- **2011/07**
  - Repeated HIV screening test & RPR: negative

- **2012/03**
  - HIV screening test & RPR: negative

- **2012/06**
  - Repeated HIV screening test & RPR: negative

- **2012/07-12**
  - Recurrent condyloma & paraphimosis
  - LMD: oral & topical herbal medications use
  - Self-reduction
  - Recurrent penis wound(+)
Present illness

2012

12/07
Penis swelling & pain

12/08
Penis discoloration & numbness
Fair general activity & appetite
Fever(+) up to 38, URI S/S(-), UTI S/S(-), GI S/S(-)

12/12
Visit our ER

LMD: ER visit suggested
Physical examination

• General appearance
  – Consciousness clear; JOMAC: intact
  – Vital signs: T/P/R 38.8/115/20, BP 94/55
  – BH: 170cm, BW: 65kg, BMI: 22.5kg/m2

• HEENT:
  – Conjunctiva: pink; Sclera: anicteric
  – Pupils: isocoric; Light reflex: +/+ 
  – Neck: supple, LAP (-), goiter(-)

• Chest
  – Symmetric expansion
  – Breath sound: clear
Physical examination

• Heart
  – Regular heart beat, no obvious murmur

• Abdomen
  – Soft and ovoid; Bowel sound: normoactive
  – No abd. Tenderness
  – Bil. inguinal area pustules
  – Penis swelling, pain & glandular gangrenous change

• Extremities
  – Warm, edema(-), rash(-), Ecchymosis(-)
Urologist
1. Penile wound infection with systemic bacteremia
2. **Chronic paraphimosis**, with glans suspected gangrene

Arrange CT
Dorsal slit
Inform possible penectomy
<table>
<thead>
<tr>
<th></th>
<th>Hb</th>
<th>MCV</th>
<th>PLT</th>
<th>WBC</th>
<th>PT</th>
<th>PTT</th>
<th>INR</th>
</tr>
</thead>
<tbody>
<tr>
<td>units</td>
<td>g/dL</td>
<td>fL</td>
<td>K/uL</td>
<td>K/uL</td>
<td>Sec</td>
<td>Sec</td>
<td></td>
</tr>
<tr>
<td>result</td>
<td>13.4</td>
<td>86.3</td>
<td>177</td>
<td>15.68</td>
<td>12.4</td>
<td>30.3</td>
<td>1.19</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>%</td>
<td>1.0</td>
<td>9.0</td>
<td>71.5</td>
<td>9.5</td>
<td>0</td>
<td>0</td>
<td>9.0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>BUN</th>
<th>Cre</th>
<th>Na</th>
<th>K</th>
<th>Ca</th>
<th>Mg</th>
</tr>
</thead>
<tbody>
<tr>
<td>units</td>
<td>mg/dL</td>
<td>mmole/L</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>result</td>
<td>22.3</td>
<td>0.8</td>
<td>136</td>
<td>4.1</td>
<td>1.71</td>
<td>1.10</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>AST</th>
<th>ALT</th>
<th>T-bil</th>
<th>Alb</th>
<th>CRP</th>
<th>NH3</th>
<th>Lactate</th>
</tr>
</thead>
<tbody>
<tr>
<td>units</td>
<td>U/L</td>
<td>mg/dL</td>
<td>g/dL</td>
<td>mg/dL</td>
<td>µmole/L</td>
<td>mmole/L</td>
<td></td>
</tr>
<tr>
<td>result</td>
<td>29</td>
<td>22</td>
<td>0.83</td>
<td>2.0</td>
<td>27.62</td>
<td>32</td>
<td>0.97</td>
</tr>
</tbody>
</table>
## Laboratory results

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.022</td>
<td>5.5</td>
<td></td>
<td>100(2+)</td>
<td>-</td>
<td>1+</td>
<td>3+</td>
<td>normal</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Bil.</th>
<th>Nitrate</th>
<th>WBC</th>
<th>RBC</th>
<th>WBC</th>
<th>Epi.</th>
<th>Cast</th>
<th>Bacteria</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>mg/dL</td>
<td>/HPF</td>
<td>/HPF</td>
<td>/HPF</td>
<td>0-1</td>
<td>0-2</td>
<td>1+</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1+</td>
<td>-</td>
<td>3+</td>
<td>&gt;100</td>
<td>&gt;100</td>
<td>0-1</td>
<td>0-2</td>
<td>1+</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Antigen</th>
<th>TPHA</th>
<th>HBsAg</th>
<th>Anti-HCV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anti-HIV</td>
<td>1:80(-)</td>
<td>Negative</td>
<td>Negative</td>
</tr>
</tbody>
</table>
Chest CT
Chest echo

Echo diagnosis
1.2 well defined lung nodule (9.2x19.3; 9.4 x10.8 mm) with hypoechogenecity and hypovascularity over L’t anterior upper lung field
2. Bil. minimal pleural effusion

Echo guided aspiration x 2 for cultures, cytology, aspergillus Ag, & cryptococcus Ag
Pelvis CT
Initial diagnosis

- Penile wound infection
- Penile dry gangrene
- Lung nodules, cause to be determined
- Chronic paraphimosis
- Condyloma history
<table>
<thead>
<tr>
<th>Test Description</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urine/Sputum/left chest nodule AFS</td>
<td>Negative * III/III</td>
</tr>
<tr>
<td>Blood/Left chest nodule Cryptococcus Ag</td>
<td>Negative</td>
</tr>
<tr>
<td>Blood/Left chest nodule Aspergillus Ag</td>
<td>Negative</td>
</tr>
<tr>
<td>Urine Legionella Ag</td>
<td>Negative</td>
</tr>
<tr>
<td>Blood Mycoplsma IgG/IgM</td>
<td>Negative</td>
</tr>
<tr>
<td>Urethral discharge Chlamydia Ag</td>
<td>Negative</td>
</tr>
<tr>
<td>Urine/Sputum/left chest cytology</td>
<td>Negative * III/III</td>
</tr>
</tbody>
</table>
Culture results

<table>
<thead>
<tr>
<th></th>
<th>OSSA</th>
<th>OSSA 2+</th>
<th>OSSA 1+</th>
<th>OSSA 1+ &amp; C. albicans 2+</th>
<th>Corynebacteriunm species 7000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood culture</td>
<td>*II/II</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Left chest nodule</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Penis discharge</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R’t inguinal pus</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urine culture</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Antibiotic(S,I,R)</th>
<th>ID+DS Blood.#1</th>
</tr>
</thead>
<tbody>
<tr>
<td>CC:Clindamycin</td>
<td>R</td>
</tr>
<tr>
<td>E:Erythromycin</td>
<td>R</td>
</tr>
<tr>
<td>FA:Fusidic acid</td>
<td>S</td>
</tr>
<tr>
<td>GM:Gentamicin 10µg</td>
<td>I</td>
</tr>
<tr>
<td>OX:Oxacillin</td>
<td>S</td>
</tr>
<tr>
<td>SXT:Trimethoprim/sulfamethoxazole</td>
<td>S</td>
</tr>
<tr>
<td>TEC:Teicoplanin</td>
<td>S</td>
</tr>
<tr>
<td>TGC:Tigecycline</td>
<td>S</td>
</tr>
</tbody>
</table>
Cardiac echo

• 12/14 Transthoracic UCG
  – The LV systolic function is normal.
  – Miild MR and TR
  – Mild pericardial effusion
  – No vegetation noted.

• 12/21 Transesophageal UCG
  – No vegetation
  – No shunting
Treatment course

12/13 B/C: OSSA *II/II
**Oxacillin 2g Q4H**

**Gentamycin**

- **12/20 Plasty**: Keep wound CD with Flamazine ointment QD; surgical debridement not suggested
- Bil. inguinal area pustules; **bil. arms & thighs purpuric, irregular shape variously sized maculles** → **12/21 Derma.**: OSSA bacteremia with generalized septic embolism → pustule culture: **OSSA & C. albican** → apply topical fucidin
Treatment course

Oxacillin 2g Q4H

2013/1/2
Dry gangrene peel off
Electrocauterization for condyloma

2013/1/16
Video-assisted thoracic surgery (VATS) for Left lung Empyema
Pathology: Fibrinous material with focal organization.
Treatment course

2013/3/26
Recurrent condyloma
Electrocauteration

Loss of follow-up
Final diagnosis

- Penile gangrene, glandular full thickness necrosis
- Septic pulmonary embolism with left empyema secondary to OSSA-related penis wound infection, status post VATS
- Chronic paraphimosis
- Recurrent condyloma
Discussion

• Penile gangrene
• Multiple septic embolism
Penile gangrene

• Rare, but troublesome problems with high mortality

• Etiology
  – **Infection** *(Wet)*
  – Trauma
  – Vasculogenic
    • Mechanism: spontaneous embolism, thrombotic phenomenon, widespread ligation of collateral circulation, atherosclerosis...
    • Severe systemic vascular disease, DM, HTN, ESRD with penile calciphylaxis, coagulopathy...
  – Others
    • Priapism, **strangulation**, paraphimosis,
    • Penile prostate implantation, penis peri-vascular tumor invasion, intra-coporporeal drug injection
Aim: To describe experience of treating ischemic penile gangrene; review related literature and try to summarize a practical algorithm for penile gangrene

Management of Ischemic Penile Gangrene: Prompt Partial Penectomy and Other Treatment Options

Table 1  Clinical history of five patients with penile gangrene

<table>
<thead>
<tr>
<th></th>
<th>Pt1</th>
<th>Pt2</th>
<th>Pt3</th>
<th>Pt4</th>
<th>Pt5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>63</td>
<td>64</td>
<td>75</td>
<td>60</td>
<td>75</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>Type 2 OHA</td>
<td>–</td>
<td>–</td>
<td>Type 2 OHA</td>
<td>Type 2 Insulin</td>
</tr>
<tr>
<td>Renal insufficiency</td>
<td>–</td>
<td>+</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Vascular disease</td>
<td>–</td>
<td>–</td>
<td>Deep vein thrombosis</td>
<td>–</td>
<td>Old ischemic CVA</td>
</tr>
<tr>
<td>Operation within 1 month</td>
<td>–</td>
<td>–</td>
<td>Herniorrhaphy</td>
<td>–</td>
<td>Penile prosthesis</td>
</tr>
<tr>
<td>Definite coagulopathy</td>
<td>–</td>
<td>–</td>
<td>Antiphospholipid syndrome, protein S deficiency</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Presentation (dry/wet gangrene)</td>
<td>Dry</td>
<td>Dry</td>
<td>Dry</td>
<td>Dry, partially liquefaction</td>
<td>Dry</td>
</tr>
<tr>
<td>Treatment</td>
<td>Duration of conservative treatment before partial penectomy (days)</td>
<td>57</td>
<td>88</td>
<td>29</td>
<td>15</td>
</tr>
<tr>
<td>Resected distal penile length</td>
<td>3</td>
<td>6</td>
<td>4</td>
<td>4.5</td>
<td>5.5</td>
</tr>
<tr>
<td>Circumcision</td>
<td>+</td>
<td>–</td>
<td>+</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Suprapubic cystostomy</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>–</td>
</tr>
<tr>
<td>Debridement</td>
<td>1</td>
<td>–</td>
<td>1</td>
<td>2</td>
<td>–</td>
</tr>
<tr>
<td>Survival after 1 year</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>


**Infection Control**

- WBC ↓
- CRP ↓
- Broad spectrum antibiotics

**Differentiation between Wet and Dry Penile Gangrene**
- Detailed present and past history
- Thorough physical examination
- Urinalysis, urine culture, wound culture
- Hemogram, biochemistry, coagulation profiles

**Dry, ischemic gangrene**
- Diabetic mellitus
  - Control sugar
- End stage renal disease
  - Regular hemodialysis
  - Parathyroidectomy if calcium imbalance
- Correct coagulopathy
  - Phimosis
  - Circumcision or dorsal slit
- Voiding difficulty
  - Suprapubic cystostomy

**High operation risk**
- Multi-morbidity
  - Conservative treatment
  - Wound dressing
  - Antibiotic usage
  - Wait for autoamputation

**Small circumcised lesion**
- With positive Duplex signal of the penis
- Angiography reveals appropriate graft vessel

**Penile Revascularization Technique**

**The others**
- Negative Duplex signal of the penis
  - Prompt partial penectomy
  - Pre- and post-operative psychiatrist consultation
Dry Gangrene of the Penis Induced by a Bullring for Sexual Stimulation Purposes

U/C: E. coli & Enterococcus; Sensitive to ampicillin

Revascularization of penis

• Successful revascularization for penile ischemic gangrene was performed in patients with penile calciphylaxis and end-stage renal disease

Septic Pulmonary Embolism (SPE)

• Uncommon, without a specific clinical presentation
  – Fever (85.71%), Dyspnea (48.21%), Chest pain (48.81%), Cough (41.07%), Hemoptysis (14.29%), Respiratory failure (15.48%), Septic shock (10.71%), empyema (8.33%)
  – Rui Ye et al, Respiratory Medicine (2014) 108, 1e8

• Pathogenesis: an embolic infected blood clot causing infarction in the pulmonary vasculature leading to a focal abscess

• Frequently related with right-sided endocarditis

• A penile wound infection combined with SPE has not previously been described yet.
## Septic Pulmonary Embolism

<table>
<thead>
<tr>
<th>Clinical risk factor</th>
<th>Microorganism isolated from blood cultures</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MSSA</td>
<td>MRSA</td>
<td>Fusobacterium</td>
<td>KP</td>
<td>Candida</td>
<td>VS</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(n)</td>
<td>(n)</td>
<td>(n)</td>
<td>(n)</td>
<td>(n)</td>
<td>(n)</td>
<td></td>
</tr>
<tr>
<td><strong>Infective focus</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV drug abuse</td>
<td>26</td>
<td>11</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Catheter-related infection</td>
<td>3</td>
<td>4</td>
<td>0</td>
<td>1</td>
<td>5</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Skin and soft tissue infection</td>
<td>10</td>
<td>10</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Liver abscess</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Infective endocarditis</td>
<td>0</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Septic thromophlebitis</td>
<td>0</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Lemierre’s syndrome</td>
<td>0</td>
<td>0</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td><strong>Medical conditions</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diabetes</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>5</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Chemoradiotherapy</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Immunocompromised(^a)</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td><strong>Complications</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Empyema</td>
<td>6</td>
<td>1</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

MSSA: Methicillin-sensitive *Staphylococcus aureus*; MRSA: Methicillin-resistant *Staphylococcus aureus*; KP: *Klebsiella Pneumonia*; VS: *Viridians Streptococci*.

\(^a\) Immunocompromised from long-term oral administration of steroids, splenectomy and other reasons.

---

*Rui Ye et al, Respiratory Medicine (2014) 108, 1e8*
Wedge-shaped peripheral lesion

Feeding vessel sign

Peripheral nodules with cavitation
Non-nodular infiltrate

Pulmonary Embolism
Septic Pulmonary Embolism

• Treatment
  – Broad-spectrum Penicillins and Cephalosporins
  – Based on culture results
  – Usually does not involve anticoagulants
  – Risk of bleeding of infective emboli

• In one study, 18 of 32 cases were treated surgically, predominately targeted at valvular vegetations and poor infection control, such as empyema
  • Rui Ye et al, Respiratory Medicine (2014) 108, 1e8
Back to The Patient

• The glandular eschar was removed and glandular full thickness necrosis was impressed ➔ Resulted from paraphimosis and veno-occlusion

• Septic pulmonary embolism with left empyema secondary to OSSA-related penis wound infection, status post VATS

• Recurrent condyloma
Conclusion

• Genital infection may progress to systemic diseases with multiple organ involvement.
• Glandular full thickness necrosis might be caused by paraphimosis.
• Distinguish dry/wet gangrene-> prompt penectomy