CCA Master Class Series
Nailing difficult radiology cases
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CCA MASTER CLASS:
NAILING DIFFICULT
RADIOLOGY CASES.

May 6, 2021, 12:00PM – 1:00PM EDT
William Hsu
Imaging study interpretation

- Integrating the knowledge of radiographic anatomy, neuroanatomy, pathology and clinical information.
- Some of the clinical information are retrospectively collected from chiropractors, online sources to enhance the learning experience.
Case 1

- 24-year-old male with progressively worsening low back pain and right anterior thigh pain.
- Seek chiropractor
  - Ordered spinal films.
  - No improvement with treatment
- Seek second opinion
Poll question 1
Poll question 2
Findings

- Unremarkable lumbar study.
Findings

- A large right paratracheal soft tissue mass is partially visualized below the right clavicle with left displacement of the trachea on the APLC view.
- In addition, there is spraying of the carina with a soft tissue mass deviating the azygoesophageal recess to the right from T6 to T9 level on the thoracic spine study.
Diagnosis

- A large middle mediastinal mass.
- Differential diagnosis should include pathology of the esophagus, lymphoid tissue and vascular structures.
- A CT with contrast is warranted to further assess this soft tissue mass.

- Start with a chest x-ray.
Findings

- A lobulated right paratracheal mass measuring 5.5cm is observed with left tracheal deviation.
- The mass is occupying the superior half of the retrosternal clear space.
- This is associated with nodularity of the hila observed on the lateral view.
- Spraying of the carina with right deviation of the azygoesophageal line is seen.
Diagnosis

- A large right paratracheal mass with extension to the anterior mediastinum and likely hilar and subcarina involvement.
- The differential should include lymphoma, teratoma, thyroid mass and thymoma.
- Given the age of this patient, lymphoma should be ruled out.
- RECOMMENDATION:
  - CT scans of the chest and abdomen are recommended.
Hodgkin Lymphoma

- The World Health Organization (WHO) classification:
  1. Nodular sclerosing (60-80%)
  2. Mixed cellularity
  3. Lymphocyte depleted, and
  4. Lymphocyte rich
  5. Nodular lymphocyte-predominant Hodgkin lymphoma (NLPHL), is a distinct entity with unique clinical features and a different treatment paradigm.
Hodgkin Lymphoma

- In classical Hodgkin lymphoma, the neoplastic cell is the Reed-Sternberg cell.
- Comprise only 1-2% of the total tumor cell mass.
Hodgkin Lymphoma

- Nodular sclerosing Hodgkin Lymphoma (NSHL)
  - Constitues 60-80% of all HL.
  - Found in adolescents and young adults.
  - Usually involves the mediastinum and other supradiaphragmatic sites.
Hodgkin Lymphoma

- Who is susceptible
  - Previous Epstein-Barr virus (EBV) infection
  - HIV-positive patients
  - Familial - siblings of an affected individual have a 3- to 7-fold increased risk
Hodgkin Lymphoma

- Epidemiology
  - As of 2013-2017, the age-adjusted incidence is 2.6 cases per 100,000 population in US. National Cancer Institute (NCI) Surveillance Epidemiology and End Results (SEER) database Website.
  - bimodal distribution
    - initial peak is in young adults (15-34 years);
    - second peak is in older adults (> 55 years).
Hodgkin Lymphoma

Prognosis

<table>
<thead>
<tr>
<th>Stage at diagnosis</th>
<th>Stage distribution %</th>
<th>5-year relative Survival, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage I (only in originating layer of cells)</td>
<td>15</td>
<td>92.3</td>
</tr>
<tr>
<td>Stage II (confined to primary site)</td>
<td>40</td>
<td>93.4</td>
</tr>
<tr>
<td>Stage III (spread to regional lymph nodes)</td>
<td>21</td>
<td>83.0</td>
</tr>
<tr>
<td>Stage IV (cancer has metastasized)</td>
<td>20</td>
<td>72.9</td>
</tr>
<tr>
<td>Unstage</td>
<td>4</td>
<td>82.7</td>
</tr>
</tbody>
</table>

Hodgkin Lymphoma

- Staging

Staging of lymphoma

Stage I
Stage II
Stage III
Stage IV

A: absence of B symptoms
B: fever, night sweats, weight loss
Hodgkin Lymphoma

- Clinical presentation
  - Asymptomatic lymphadenopathy (above the diaphragm in 80% of patients)
  - Constitutional symptoms (“B symptoms”) – weight loss, night sweats (40% patients)
  - Chest pain, cough, shortness of breath
  - Pain at sites of nodal disease, precipitated by drinking alcohol (10%)
  - Pruritus
  - Back or bone pain
Update of patient

- Patient was grateful for the review of spinal x-ray and follow-up chest x-ray.
- Final diagnosis of stage 3 Hodgkin lymphoma was made.
- After receiving chemotherapy for 6 months and radiation therapy, he is in remission.
- As for the low back pain and right anterior thigh pain, it went away with chemotherapy – lumbar nerve was compressed by enlarged intraforaminal lymph nodes.
Poll question 3
Case 2

- 27 year-old female with 9 months of left shoulder pain.
- Sought out several medical help
  - Diagnosed with frozen shoulder, biceps tendinitis with no imaging.
- Eventually sought out chiropractic care
  - Limited left shoulder ROM
  - Noticeable swelling of the left shoulder
  - X-Ray was ordered

Courtesy of Dr. Chris Gordon-Tennant
May 23, 2018
27 year-old female with 9 months of left shoulder pain.

Sought out several medical help
  • Diagnosed with frozen shoulder, biceps tendinitis with no imaging.

Eventually sought out chiropractic care
  • Limited left shoulder ROM
  • Noticeable swelling of the left shoulder.
Findings

- Mottled densities are noted in the left proximal humerus extending from the humeral head into the proximal humeral shaft at least 9cm with medullary sclerosis. In addition, cortical disruption with extension of mottled densities into the soft tissue is observed around the humeral head, slightly displacing the humeral head inferiorly. Subtle periosteal reaction is detected at the lateral border of the proximal humeral shaft. Multiple varying sized pulmonary masses are noted bilaterally in the visualized portions of the lung.
Diffused mottled densities in the left proximal humerus with cortical destruction, periosteal reaction and soft tissue extension with multiple pulmonary masses. The radiographic features in a young individual raises two possibilities: osteosarcoma of the left humerus with pulmonary metastasis or lymphoma of the lung with bony metastasis to the left humerus.

**Recommendation:**
- Further investigation is recommended with chest x-ray to verify the pulmonary masses, bone scan of the body to investigate spread and MRI of the left shoulder to delineate the extent of bony lesion.
September 2017, Jxxx started experiencing pain in her shoulder. When going to the doctor, she was told it was just tendinitis and given inflammatory's and that it would resolve itself. After a month of on going pain, she returned to the doctor and was now told it was a torn bicep tendon and was recommended to physio therapy. Jxxx did the therapy for a while and found no results. She went back and was referred to local shoulder center and was told now that it was a frozen shoulder. They administered cortisone shots and informed he that the frozen shoulder would resolve itself. Jxxx then continued to try alternatives at home such as, acupuncture, heating pads, ice packs, stretching, tiger balm and volteren and still found no results. After 9 months of pain a friend referred Jxxx to another physio therapist who upon seeing her right away sent her to the hospital and scans done. Once Jxxx did the tests, she was informed by the doctors that she had Osteosarcoma. Which is an aggressive bone cancer, which had metastasized (spread) to the lungs. Due to being misdiagnosed for several months, several times. The doctors informed Jxxx that the cancer was incurable and inoperable. Jxxx was given a 30% chance to live, which is 3-5 years. Jxxx was put on chemo therapy right away, and did 2 sessions. With no results, the doctors advised her the chemo therapy was not working. Jxxx has chosen to try an alternative route. She has started O-Zone therapy which has costed her $5000 in just blood tests. Her O-Zone treatments, which are 3 sessions a week along with Vitamin C injections are costing her $1000 a week. Jxxx is also trying to go abroad and receive treatment that is not available in Canada or the United States, which is costing her 18,955 USD for 3 weeks and that is assuming she would only need 3 weeks. Our goal is to raise as much as we can to aid Jxxx’s battle. Doctors have informed Jxxx that she is incurable and left her with little hope. Our intention is to try and find a way to beat the odds or at least have Jxxx live a comfortable life with the cancer. Choosing the natural and alternative route is expensive, but at this point our only hope. Our family has come together to try and make this happen for her and hope that you find it in your hearts to help her cause. Thank you for taking the time to read Jxxx’s story, and we hope you will take a little more time in sharing and spreading the word.
Post-script

- On December 29, 2018 she passed away.
- 15 months after the onset of symptoms.
- 6 months after the diagnosis.
Adhesive capsulitis

- Pathological process in which the body forms excessive scar tissue or adhesions across the glenohumeral joint, leading to pain, stiffness and dysfunction.
- Spontaneously (primary or idiopathic adhesive capsulitis) or following shoulder surgery or trauma (secondary adhesive capsulitis).
**Primary adhesive capsulitis**

- Idiopathic
- 2190 adhesive capsulitis patients
- age distribution of 56.4 ± 13.1 years.
- Patient profiles
  - Overweight
  - Diabetic
- Obesity and diabetes were significantly associated with adhesive capsulitis

Diabetes and 1st adhesive capsulitis

- Prevalence of diabetes
  - General population – 2%
  - Diabetic population – 38.6%
  - Pre-diabetic pop – 32.95%

- Total prevalence of a diabetic condition in patients with adhesive capsulitis was 71.5%

The prevalence of a diabetic condition and adhesive capsulitis of the shoulder.
Secondary adhesive capsulitis

- Secondary to
  - periarticular fracture dislocation of the glenohumeral joint or other severe articular trauma.
  - open or arthroscopic shoulder surgery, including rotator cuff repair and shoulder arthroplasty.
Diagnosis of adhesive capsulitis

- A clinical diagnosis made on the basis of medical history and physical exam.
- Often a diagnosis of exclusion.
- Other causes of a painful stiff shoulder must be excluded before a diagnosis of adhesive capsulitis is rendered, including
  - septic arthritis, mal-position of orthopedic hardware, fracture malunion, rotator cuff pathology, glenohumeral arthrosis or cervical radiculopathy.
Diagnosis of adhesive capsulitis

- Usually first present with shoulder pain followed by gradual loss of both active and passive range of motion.
- External rotation is often the first motion affected.

- Imaging studies are not necessary for the diagnosis of adhesive shoulder capsulitis but may be helpful to rule out other causes of a painful and stiff shoulder.
Poll question 4
Case 3

- 58 year-old male marathon runner with acute thoracic spine pain.
- Visit chiropractor two weeks ago with stiff thoracic spine around T7.
  - Negative compression, Vasalva and so on test.
  - Treat with ultrasound, pressure points on the total spine and adjustment.
  - Left happy and called next day to thank chiro.
- Same one week later,
  - But call next day with severe pain while running.
  - X-ray ordered by MD – multiple compression fractures
  - Chiro suspects Scheuermann’s disease.
  - Patient in severe pain and went for MRI study.

Courtesy of Dr. Yves Fournier, Montreal
October 3, 2018
Findings

- Wedged deformities of T7, 8 and 9 with no obvious step defect or zone of impacted trabeculae; however, sclerosis of the T7 vertebral body is worrisome, suggestive of possible malignancy.
- No obvious paraspinal soft tissue swelling.
- Calcified granuloma in the right lower lung field.
Findings

- The wedged T7 vertebral body shows hypointense T1 and minimal hyperintense T2 marrow signal.
- This is atypical for new compression fracture which should have shown hypointense T1 and hyperintense T2 marrow signal.
- Is this a pathological fracture?
What you must consider!

- If you really want to see edema, the MR sequence you must order is STIR sequence.
Lumbar compression fractures of differing acuity in a 70-year-old man. A–C, Sagittal T1-weighted (A), T2-weighted (B), and STIR (C) MRI images of lumbar spine show marked compression deformity of L2 vertebral body with approximately 80% loss of height (black arrows, A and B) and preservation of concave posterior margin of vertebral body. L2 vertebral body is T1 hypointense and T2 and STIR hyperintense due to bone marrow edema from acute fracture superimposed on chronic compression deformity. Horizontally oriented, low-signal, acute fracture line is evident in L2 (arrowhead, C). Chronic compression fractures of L1, L3, L4, and L5 (white arrows, A) show both anterior wedge and central depression deformities. Vertebral bodies are isointense to normal bone marrow on all pulse sequences, indicating chronic nature of abnormalities.
Diagnosis

- Acute fracture superimposed on chronic compression deformity of T7.
- Old compression fractures of T8 and T9.
If this case goes to court?

- Do you think the chiropractor cause the acute fracture of T7?
Case 4

- 65-year-old male with chronic neck pain and coldness in hands and feet.
- Unsteady gait.
Findings

- Moderate disc narrowing with bone spurring at C5-6, mild at C7-T1 and minimal at C4-5 and C6-7.
- Uncinate blunting with foraminal encroachment at C4-5, C5-6 and C6-7, worse at C5-6.
- A thick linear vertical density approximately 3mm thick is seen posterior to the vertebral bodies of C4, C5 and C6 narrowing the central canal by 30%.
Diagnosis

- Radiographic suggestion of ossification of posterior longitudinal ligament from C4 to C6 with central stenosis.
- Moderate degenerative disc disease at C5-6, mild at C7-T1 and minimal at C4-5 and C6-7.
- Moderate uncovertebral arthrosis with foraminal stenosis at C5-6 and mild at C4-5 and C6-7.
Recommendation

- Neurological examination for cervical spondylotic myelopathy is recommended and confirmed with cervical MRI study.
Poll question 6
Recap

- 24-year-old male with progressively worsening low back pain and right anterior thigh pain (2019) – *When it is important to review previous imaging studies.*
- 27-year-old female with frozen shoulder (2018) – *When to question previously given diagnosis and when to image.*