Lymphomas

Objectives:

- **(not given)**

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Resources: 435 team + Davidson + Slides + Recall questions step up to medicine.

- Editing file
- Feedback

★ Introduction to Lymphoma

For classification, all you need to know is that generally we classify lymphoma into: Hodgkin's and non-Hodgkin's lymphoma. the difference between them is mainly in treatment strategy and results. In Non-hodgkin lymphoma, know the 3 grades (Indolent, aggressive, highly aggressive). The most common type of indolent lymphoma is follicular lymphoma, the most aggressive type of the highly aggressive lymphomas is Burkitt's lymphoma.

The exact reasons is unknown, it could be related to exposure to radiation, virus infection, some genetic. In Saudi Arabia 20 years back the average age was 60 so they were a very young population that don't have cancer but now the average age is increasing to 70 and the population live more so they have more risk to cancer.

★ WHO Classification of Hematological Neoplasms (not important)

- Myeloid
- Lymphoid
  - B cell neoplasms [1]
  - T cell neoplasms
  - Hodgkin's lymphoma
- Histiocytic
- Mast Cell

★ How the patient present?

- Lymph node mass (80-90% of Hodgkin's lymphoma arise from lymph nodes, the other 20-10% from other the other lymphatic system whether lymphocytes or any organ with lymph node. As it arises commonly from the lymph nodes that means it commonly present as a mass. the exact opposite happen in non-Hodgkin's lymphoma) بيجيك المريض يقولك عندي غدة طلعت في رقبتي.

DDx of lymph node enlargement:

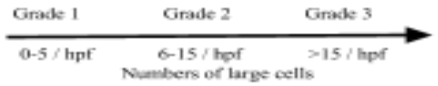
1. **Infection** (the commonest cause) commonly URTI they come with sore throat, SOB, travelling history, fever and the mass is painful and moveable and change in size bc the immune system try to fight this infection "cancer never change in size without treatment!!!!". On P/E the mass is tender
2. **Lipoma**
3. **Carotid body tumor**
4. **Lymphoma** (ask the B symptoms) + the mass is painless (unless there was infection on the top of the cancer which is rare) + ask about lymph node enlargement somewhere else and look for it on P/E
5. **Metastasis** from: thyroid + pharynx + nasal + oral cavity + posterior laryngeal wall + uvea. so ask about obstructive symptoms (difficulty swelling, difficulty breathing)
6. **Connective tissue disease**

[1] Includes plasma cell myeloma

Non-Hodgkin Lymphoma

★ Clinical Grouping of Lymphomas (important)

I. Indolent (low grade)[2] with slow progression. Normal lymph node

Types		Approximate International Incidence
• Follicular lymphoma Grade 1,2 Follicular Lymphoma in a lymph node	- Most patients have disseminated disease at diagnosis: - Lymph nodes, spleen, bone marrow - < 20 % Stage I at diagnosis  - Little clinical difference between Grades 1 and 2 - No difference in treatment of Grades 1 and 2 - Grade 1 better in prognosis compared to grade 2	**22%**
• Marginal zone lymphoma	Nodal	1%
	Extranodal (MALT)	5%
• Small lymphocytic lymphoma		6%
• Lymphoplasmacytic (Association with Waldenstrom's macroglobulinemia)		1%

II. Aggressive (intermediate grade)

Types	Approximate International Incidence:
Diffuse large B-cell lymphoma (the worst prognosis)	21% & may goes up to 70%
Primary mediastinal large B cell lymphoma	2%
Anaplastic large T / null cell lymphoma	2%
Peripheral T cell lymphoma	6%
Extranodal NK / T cell lymphoma, nasal type	-
Follicular lymphoma Grade 3	-
Mantle cell lymphoma	6%

[2] the problem with this stage is: 1- it is asymptomatic so they usually don't present early. 2- it is never curable (we can increase the duration of indolent so they don't have symptoms but we can't eradicate the disease) so the patient live with the disease but may not die because of the disease, so they always need follow up to make sure the mass doesn't increase in size

III. Highly Aggressive (High grade)

Types	Approximate International Incidence
Lymphoblastic lymphoma	2%
Burkitt's lymphoma (EBV is risk factor of Burkitt's lymphoma)	1%
Burkitt-like lymphoma	2%

- Burkitt's lymphoma is the worst lymphoma ever, you should admit the patient and start treatment (chemotherapy) right away from the same day you diagnose, why? 1- it can progress very fast within hours. 2- it responses very well to treatment, the problem with the treatment is it may lead to tumor lysis syndrome where they will be rhabdomyolysis → hyperkalemia → arrhythmia. so **YOU HAVE TO** connect the patient with monitor + call ICU to prepare for any complication.

★ Lymphoma – Staging System

- **Cotswolds Meeting modification of Ann Arbour Classification**

I- Single lymph node region (or lymphoid structure)
II- 2 or more lymph node regions
III- Lymph node regions on both sides of diaphragm
IV- Extensive extranodal disease (more extensive than "E")
***The higher the stage the worse the prognosis**

- **Subscripts** (important)

A	Asymptomatic
B	- Fever, > 38º (high grade fever), recurrent. - Night sweats, drenching (soaked in sweat), recurrent. - Weight loss, > 10% weight in 6 months. One symptom is enough to categorize the patient in category B, but since it is subjective we might put them in the wrong category and treat them with aggressive drugs while they don't have the disease.
X	Bulky disease - Mediastinal: > 10cm, or > 1/3 internal transverse diameter at T5/6 on PA CXR - Non-mediastinal: > 5-6 cm
E	Limited extranodal extension from adjacent nodal site

★ Staging Investigations

- **Essential**
  - Biopsy (trucut biopsy[3]) – pathology review (it will tell us whether there is malignant cell or not, if yes it is Hodgkin or non-Hodgkin, which type of Hodgkin)
  - History – B symptoms, PS
  - Physical Exam – nodes, liver, spleen, oropharynx
  - CBC
  - Creatinine, liver function tests[4], LDH[5], calcium
  - Bone marrow aspiration & biopsy
  - CT neck, thorax, abdomen, pelvis

- **Additional**
  - PET or ^{67}Ga scan

Gallium (Ga) scan: it is a nuclear substance that could be taken by the lymph node, when the lymph node take this material it will release radiation and become shining, we usually **do this test before starting the treatment** and months after the treatment to compare the size if there is reduction or not. the problem is this scan is 70% sensitive so we might miss some patients. why don't we do biopsy everytime? because with the radiation and chemotherapy the mass will become fibrosed and it will be difficult to take biopsy from it.

PET can is very sensitive (99%) but it is not necessary for diagnosis or follow up.

PET scan is used for follow up to check recurrences of the disease. If PET is unavailable Gallium scan can be used but it should be performed before treatment. If gallium was +ve before treatment of the diagnosed lymphoma it can be used for follow up, if not, it can't be used.

  - CT / MRI of head & neck (we use it for staging)
  - Cytology of effusions, ascites
  - Endoscopy[6]
  - Endoscopic U/S [7]
  - MRI - CNS, bone, head & neck presentation
  - HIV serology
  - CSF cytology - testis, paranasal sinus, peri-orbital, paravertebral, CNS, epidural, stage IV with bone marrow involvement.

A 40- year old male patient came to you with lump on the neck, he doesn't have fever , not painful, not tender, started 3 months ago. On examination you didn't find any lymph swelling other than the neck. You suspected lymphoma, what could confirm your diagnosis?

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[3] We don't use FNA cuz it will take very small tissue which will be not conclusive to diagnose lymphoma, it might tell me there is malignant cell formation. it is helpful in micro in case of infection but we don't usually do it because it is costly.

[4] cuz we need to have a baseline before treatment + albumin is prognostic factor for lymphoma (if it increase it means the treatment is good)

[5] people with high LDH have lower response to treatment

[6] For gastric lymphoma

[7] For gastric lymphoma

★ International Prognostic Index for NHL

Age	> 60
Stage	3, 4
PS	ECOG ≥ 2
LDH[10]	> normal
Extranodal	> 1 site

Prognostic index[8]	Number of Risk Factors	5 years overall survival (OS)[9]
Low Risk	0-1	75%
Low intermediate	2	51%
High intermediate	3	43%
High risk	4-5	26%

Lymphoma treatment

★ Indolent Lymphoma -e.g. Follicular Grade 1/2, small lymphocytic[11], marginal zone

- **Limited Disease**
  - (Stage 1A, 2A if 3 or less adjacent node regions)
  - IFRT[12] 30-35 Gy (Use 35 Gy for follicular. 30 Gy for SLL, marginal)
  - Expect ~ 40% long term FFR
  - Alternate:
    - ✓ CMT
    - ✓ Observation. Treat when symptomatic.
- **Advanced Stage**
  - (Some Stage 2, Stage 3, 4)
  - Palliative RT (IFRT 15 – 20 Gy/5) for **localized** symptomatic disease (the only situation we give local treatment for lymphoma is in indolent lymphoma in high stage 'stage 3 and 4')
  - Palliative chemotherapy (CVP, chlorambucil) for **disseminated** symptomatic disease
  - Observation only if low bulk, asymptomatic. Treat when symptomatic.

★ Aggressive Lymphoma (e.g. Diffuse large B cell)

- **Stage I, some Stage II**
  - CHOP[13]x 3 + IFRT (35-45 Gy) higher radiation dose if residual disease chemo+ radiotherapy
  - Expect ~ 75% long term FFR

  we can give radiotherapy only if it was bulky[14] or residual

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[8] As the index increase (the age increase, LDH is high, stage 4...etc.) the less survival rate
[9] Diffuse large cell lymphoma
[10] what is the importance of LDH in NHL? it is an important prognostic factor
[11] if the mass is very small and the patient came in early stage we use local treatment and the patient can be cured (the only situation where we can treat lymphoma)
[12] Involved Field Radiotherapy.
[13] CHOP is an acronym for a chemotherapy regimen
[14] if it is 10 cm in mediastinum (or 1/3rd of the mediastinum diameter) or 5 cm if the mass outside the mediastinum

- **Stage III, IV, B symptoms, or bulky disease** chemotherapy all the way

CHOP x 6-8 **IFRT (35-45 Gy) to** • sites of initial bulk • residual disease (i.e. PR)	**or CHOP q 21 days** • **C**yclophosphamide • doxorubicin (formerly **H**ydroxydaunorubicin) • vincristine ("**O**ncovin") • **P**rednisone (p.o. x 5 days) CHOP-R x 8 ® ~40 % 3 yrEFS, OS (vs. CHOP x 8)

In stage 3 always give chemotherapy but if there is residual we have to do bone marrow transplant.

- **Rituximab**

Chimeric anti-CD20 mAb:

- Mouse variable region
- Human constant region (IgG1)

Direct antitumor effects:

- Complement-mediated cytotoxicity
- Antibody dependent cellular cytotoxicity

Synergistic activity with chemotherapy

- **Chemotherapy – Rituximab Combinations:**
  - CHOP – R
    - CHOP + rituximab (on day 1)
    - GELA study: elderly aggressive NHL . Improved EFS, OS at 3yrs with CHOP-R x 8 vs CHOP x 8.
    - MInT study: Interim results suggest superiority of CHOP-R over CHOP in younger (<60) patients.
  - CVP – R
    - Prolonged TTR in Indolent lymphoma. Probably not covered by most provincial plans

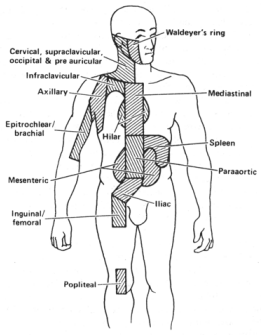
We never treat with surgery, why? 1- the disease is systemic, it doesn't involve only one area. 2- even if we didn't see anything on excision there might be some microscopic masses, so we can't have a good marginal excision.
WE ONLY PERFORM SURGERY WHEN ITS AN EMERGENCY, compressive symptoms like an obstruction, choking or dyspnea

★ Extranodal Lymphoma

- Same treatment as nodal lymphoma
- Notable Exceptions:
  - Gastric MALT
  - Testis
  - CNS
  - Skin

Lymphoma Follow-up

- Hx, Px q3mo for 2 yrs, then q6mo to 5 yrs and then annually.
- CBC, LDH
- CT chest, abdo, pelvis q6mo to 5 yrs
- TSH at least annually after neck irradiation
- Breast cancer screening for women treated with chest radiation 10 yrs post RT



Hodgkin Lymphoma (Hodgkin's disease)

1) Nodular lymphocyte-predominant HL*
2) Classical HL
    - Lymphocyte-rich classical HL (the best pathological prognosis, almost always cured)
    - Nodular sclerosis HL
    - Mixed cellularity HL
    - Lymphocyte depletion HL (the worst pathological prognosis. Comes in high stage, old people who can't tolerate treatment. We just give palliative treatment)

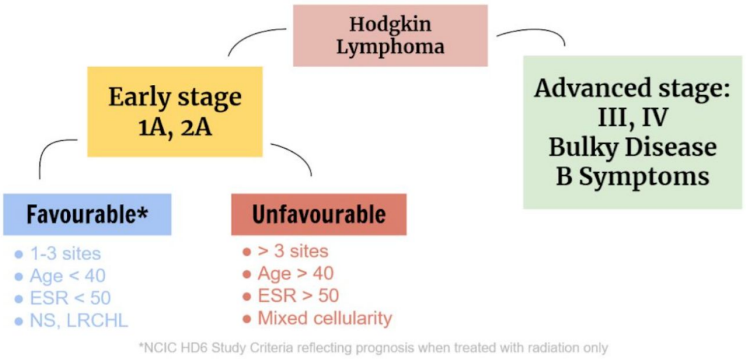
★ Hodgkin's Disease - Staging Investigations

- Biopsy – pathology review, we will see Hodgkin cells (dark nucleus, dominant cytoplasm) only 15% of the mass will have malignant cells (Hodgkin cells) the rest will be inflammatory cells, that's why it is better prognosis compare to non-Hodgkin lymphoma + it can be cured by chemo
- History – B symptoms, pruritus, alcohol pain, PS
- Physical Exam – nodes, liver, spleen, oropharynx
- CBC, ESR
- Creatinine, liver function tests, LDH, calcium, albumin
- Bone marrow aspiration & biopsy
    > If abnormal CBC, Stage 2B or higher.
- CT thorax, abdomen, pelvis
- if you diagnose HL you have to assure the patient, just ask them to have patience with the treatment and the cure will come إن شاء الله

Other Investigations

- PET scan
- ^{67}Ga scan
- Lymphangiogram – if expertise available, no PET
- Pregnancy test
- oophoropexy / semen cryopreservation
    - If chemotherapy or pelvic RT
- Dental assessment – if oropharyngeal RT

★ Hodgkin's Lymphoma



- **Treatment**

Stage	Prognosis	Treatment
Early Stage HL	**Very Favourable** • Stage 1A NLPHL[15] • Stage 1A high neck NS, LRCHL	IFRT 35 Gy / 20
	Favourable: * Fewer cycles ABVD may be adequate. GHSG HD10 study, in progress, compares ABVD x 2 vs. ABVD x 4. * Lower radiation dose may be adequate.GHSG HD10 study and EORTC H9 study, in progress, compare IFRT 20 Gy with 30 Gy (HD10) and 36 Gy (H9). * Caution: late toxicity data awaited.	• ABVD[16] X 3 - 4 • IFRT 30 Gy/ 20
	Unfavourable[17]	• ABVD X 4 - 6 • IFRT 30 Gy / 20
Advanced stage HL Stage 3, 4, B symptoms, bulky disease	• ABVD X 6 – 8[18] • IFRT - sites of bulky disease - sites of residual disease (35 Gy / 20)	

Other Treatment Options for favourable prognosis

STNI (Mantle + Para-aortic nodes, spleen 35 Gy/20)
- historical gold standard
- survival CMT
- use if CTx contraindicated
- <u>but: high risk late toxicity</u>

ABVD x 2 + IFRT
- as per BCCA guidelines
- awaiting clinical trial results (GHSG HD10)

ABVD x 6
- awaiting NCIC HD.6 results

[15] Nodular Lymphocyte Predominant HL usually localized, peripheral nodal sites good prognosis, but some late relapses (>10yr)
[16] an acronym for a chemotherapy regimen
[17] NB: Overlap with favourable prognosis ESHL
[18] ABVD until 2 cycles past maximum response

you have to give systemic treatment in stage 1,2 by and local on the site of the swelling. if it is stage 3,4 we only give systemic.

ABVD

- doxorubicin (**A**driamycin)
- **B**leomycin
- **V**inblastine
- **D**acarbazine

} **IV days 1, 15**

Rough Approximation of Prognosis

	FFS	OS
Early	80 – 90%	85 – 95%
Advanced	40 – 80%*	

If RT only (STNI): Deaths from 2nd malignancy > deaths from Hodgkin's disease by 15 – 20 years

*Depending on Hasenclever Prognostic Index: based on Age>45, male, Stage 4, albumin < 4, Hb < 10.5, WBC<600 or >15000

*RT> Radiation therapy

*STNI> subtotal nodal irradiation

*EFRT> extended field irradiation

Side Effects of Radiotherapy for Hodgkin'sLymphoma:

1. Depend on
   - Dose/fractionation
   - Site
   - Irradiated volume
   - Chemotherapy
2. Acute
   - Subacute
   - Late

Toxicity of STNI for Hodgkin's Lymphoma

Acute

- Skin erythema
- Local alopecia
- Xerostomia
- Dysphagia
- Fatigue
- WBC, platelets
- Para-aortic RT
- Nausea
- Vomiting
- Diarrhea

Late

- **Hypothyroidism**
- **Cardiac**
  - (CAD, valvular disease, pericarditis)
  - 5% risk cardiac death in 20 yrs (2-3 x expected)
- **2nd malignancy (↑ risk of most solid tumors)**
  - esp.breast ca if <25yrs at time of RT
  - Lung ca in smokers
  - Solid tumour risk rises after 10 years from RT
  - Absolute Excess Risk ~1% per year

Toxicity of EFRT for Hodgkin's Lymphoma

Subacute

- Fatigue
- Xerostomia
- Pneumonitis<5%, dependent on lung volume treated
- Herpes Zoster
- Lhermitte's Syndrome

Other Lymphomas

★ MALT lymphoma

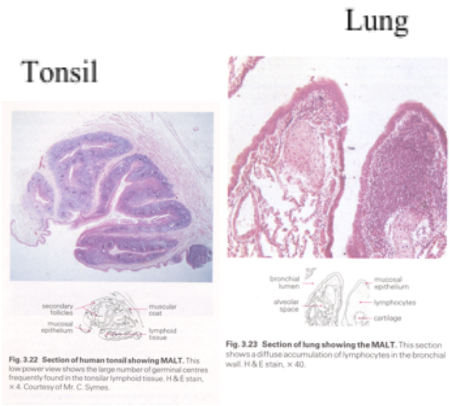
- it is an inflammatory process on the mucosa that will progress to become cancer
  - Stomach w/ H.pylori
  - Lung
  - Ocular adnexa
  - Thyroid w/hashimoto's
  - Salivary glands w/ sjogren's

} Most low grade lymphomas at these sites are MALT type

- Most localized (Stage I, II)
- History of chronic antigen stimulation
  - Autoimmune disease e.g. Sjogren's, Hashimoto's
  - H. pylori infection

Extranodal marginal zone B cell lymphoma of MALT type

- Presumed to arise in mucosa associated lymphoid tissue (MALT)



- **Treatment of MALT lymphoma**

Local treatment for Localized disease

- Radiotherapy
  - Local / regional: 30 Gy / 20
  - Surgery
- Antibiotics for gastric MALT lymphoma
  - ❖ Stage I_E, H.pylori +ve
    - PPI, 2 antibiotics (eg. clarithromycin, amoxicillin), F/U gastroscopy + Bx q6mo (every 6 months) for 2 years, then q1yr (every 1 year).
  - ❖ Stage I_E, H.pylori -ve or antibiotic failure
    - IFRT (radiation) 30 Gy (95% local control)
- Cyclophosphamide / chlorambucil
  - Disseminated disease ~ 30 % of cases, stage 2 or higher
- Treat as indolent lymphoma + H pylori eradication

- **Gastric MALT Lymphoma**

~ ½ Of gastric lymphomas

Association with:

-Chronic gastritis

-Helicobacter pylori infection

H. Pylori infection ⇨ **Accumulation of MALT** ⇨ **Lymphoma arises in acquired MALT**

if the patient had H.Pylori and developed gastritis but with no treatment or partially treated then there is a chance the patient develop MALT, or the patient might have gastritis symptoms that mask MALT here we can treat both of them by only antibiotics, but if there was recurrent then you have to give chemo (because now the mass is resistance to antibiotics)

★ Testis Lymphoma (Not important)

- Usually aggressive histology
- Elderly patients, less tolerant of chemo
- High risk relapse \ need aggressive Tx

High risk of:

- Extranodal relapse
- Contralateral testis relapse > 40% by 15yrs
- CNS relapse > 30% 10yr actuarial risk

Treatment

All pts.	• Orchidectomy (diagnostic & therapeutic) • CHOP-R x 6 • Scrotal radiation 30 Gy / 15 - Reduces risk testis recurrence to < 10%
Stage 2	• Involved field nodal RT
Stage 3 & 4	• CNS chemoprophylaxis - intrathecal MTX

Proposed WHO Classification of Lymphoid Neoplasms[19] (not important)

1. B-Cell neoplasms	2. T-cell and NK-cell neoplasms[20]
Precursor B-cell neoplasm Precursor B-lymphoblastic leukemia/lymphoma (precursor B-cell acute lymphoblastic leukemia)	**Precursor T-cell neoplasm** Precursor T-lymphoblastic lymphoma/leukemia (precursor T-cell acute lymphoblastic leukemia)

[19] they have the same treatment concept but some drugs work better with some types of tumors but doesn't have any effect for other type. You don't need to memorize them just know there is different types of lymphoma

[20] all T-cell lymphomas are bad

Mature (peripheral) B-cell neoplasm*	**Precursor T-cell neoplasm**
B-cell chronic lymphocytic leukemia/small lymphocytic lymphoma	Precursor T-lymphoblastic lymphoma/leukemia (precursor T-cell acute lymphoblastic leukemia)
B-cell prolymphocytic leukemia	**Mature (peripheral) T-cell neoplasms**
Lymphoplasmacytic lymphoma	**T-cell prolymphocytic leukemia**
Splenic marginal zone B-cell lymphoma (+/- villous lymphocytes)	**T-cell granular lymphocytic leukemia**
Hairy cell leukemia	**Aggressive NK-cell leukemia**
Plasma cell myeloma/**plasmacytoma**	**Adult T-cell lymphoma/leukemia (HTLV 1 +)**
Extranodal marginal zone B-cell lymphoma of MALT type	**Extranodal NK/T-cell lymphoma, nasal type**
Nodal marginal zone B-cell lymphoma *(+1— monocytoid B cells)*	**Enteropathy-type T-cell lymphoma**
Follicular lymphoma	**Hepatosplenic gamma-delta T-cell lymphoma**
Mantle-cell lymphoma	**Subcutaneous panniculitis-like T-cell lymphoma**
Diffuse large B-cell lymphoma	Mycosis fungoides/**Sezary syndrome**
Mediastinal large B-cell lymphoma	**Anaplastic large-cell lymphoma, T/null cell, primary cutaneous type**
Primary effusion lymphoma	Peripheral T-cell lymphoma, not otherwise characterized
Burkitt's lymphoma/Burkitt cell leukemia	Angioimmunoblastic T-cell lymphoma
	Anaplastic large-cell lymphoma, T/null cell, primary systemic type

3. Hodgkin's lymphoma (Hodgkin's disease)**left it**

Nodular lymphocyte-predominant Hodgkin's lymphoma
Classical Hodgkin's lymphoma
Nodular sclerosis Hodgkin's lymphoma (grades 1 and 2)
Lymphocyte-rich classical Hodgkin's lymphoma
Mixed cellularity Hodgkin's lymphoma
Lymphocyte depletion Hodgkin's lymphoma

★ Bone marrow transplant:
- Indication: patients resistance to medication and need aggressive chemotherapy (for example stage 3 lymphoma patient with multiple masses after 6 times course of chemo you compare PET scan and find out the size decreased in very small amount, in this situation we will give very aggressive chemotherapy but it will damage the bone marrow)
- Mechanism of action: there is stem cell in the bone marrow that replicate very fast and make a new bone marrow, so we take the bone marrow from the patient and freeze it then we start the aggressive chemotherapy then we inject the bone marrow again so the stem cell can replicate and restore the distracted bone marrow. this is called autograph.
- Compare to leukemia: in lymphoma we give the bone marrow from the patient just to restore the distracted bone marrow, but in leukemia we give bone marrow from a donor to treat the diseased bone marrow (to give a new healthy bone marrow)

Summary

Lymphoma definition	solid cohesive originate from lymphoid tissue. (T cells and B cells).	
Lymphoma	non hodgkin lymphoma	hodgkin lymphoma
Classification	1-Indolent :(low grade) like : ● follicular lymphoma grade 1,2 . ● we can wait and observe . ● -Gastric MALT Lymphoma = ½ of gastric lymphomas associated with: chronic gastritis, helicobacter pylori infection. 2-Aggressive :(intermediate grade) like : ● diffuse large B-cell lymphoma .(most common) ● we have to treat . 3-Highly aggressive :(high grade) like : ● Burkitt's lymphoma. EBV is risk factor of Burkitt's lymphoma. ● we can not wait we should treat immediately . ● Treat as medical emergency Don't wait. ● risk to develop Tumor lysis syndrome .This is a potential complication of chemotherapy seen in acute leukemia and high-grade NHL (Burkitt lymphoma patients receiving chemotherapy should be monitored)	1- CLASSICAL hodgkin lymphoma : like : ● nodular sclerosis: best paragnosis ● lymphocyte depletion :worst prognosis 2- Nodular lymphocyte predominant Hodgkin lymphoma .
Clinical presentation	1-lymphadenopathy : **painless**, mobile and firm . **sometimes the** only manifestation of disease . 2- B symptoms which are 1-night sweet 2-fever 3- weight loss ,happen in HL more than NHL. 3-Hepatosplenomegaly ,abdominal pain 4-Recurrent infection symptoms of anemia or Thrombocytopenia due to(Bone marrow involvement)	
Investigation	**To make a diagnosis:** 1- **lymph node biopsy** any lymph node > 1 cm present for more than 4 weeks that can not attributed to infection should be biopsied. . you should see **Reed -Sternberg cells** and help in subtype classification. **for staging** : 1- serum lactate dehydrogenase is prognostic indicator 2- Chest X-ray , CT , PET ,and gallium scans are of help in staging 3-liver biochemistry if it abnormal indicate liver involvement. 4-bone aspiration to see if bone marrow involvement .	

Treatment	• Local disease (stage Ia): small dose/course of chemotherapy followed by local radiation. • Advanced disease (stage II, III and IV, any "B" symptoms): chemotherapy without radiation. • Gastric MALT lymphoma is treated with antibiotics (clarithromycin and amoxicillin) • MALT lymphoma in other sites (not gastric) is treated like any other NHL • Lymphoma is NEVER treated by surgery unless it causing obstruction	The choice of treatment depends on : ❏ stage ❏ bulk of lymph nodes involved ❏ involved sits ❏ presence of "B" Symptoms 1. **early stage disease**(stage IA, I IA with no bulk is treated by chemotherapy followed by involved field irradiation. 2. **advanced disease** (all other stages)are treated with cyclical combination chemotherapy with irradiation at sites of bulk disease.
International Prognostic Index for NHL	click here	

(Click here if you want to check the extra cases from the Doctor's slides)

Questions

1-Among the following lymphomas, which one carries the worst prognosis?

A-Diffuse large B-cell lymphoma

B-Primary mediastinal large B cell lymphoma

C-Anaplastic large T / null cell lymphoma

D-Follicular lymphoma Grade 3

2-Which one of the following carries a risk factor for Burkitt lymphoma?

A-CMV

B-HSV-2

C-EBV

D-Adenovirus

3-In case of Hodgkin lymphoma , which one of the following histopathological feature indicates very bad prognosis?

A-Mixed Cellularity

B-Depletion of Lymphocytes

C-Nodular Sclerosis

D-Rich in Lymphocytes

4-Gastric MALT Lymphoma caused by which organism?

A-Staphylococcus Aureus

B-Moraxella catarrhalis

C-Coxsackie virus

D-Helicobacter Pylori

5-Which one of the following is prognostic factor?

A-Lactate dehydrogenase

B-Aldolase

C-Maltase

D-Cyclooxygenase

Answer : 1-A , 2-C , 3-B , 4-D , 5-A