METASTATIC BONE DISEASE

DR RAJAT GUPTA

ORTHOPAEDIC ONCOLOGIST

BONE CANCER CLINIC

CHANDIGARH

www.curebonecancer.com

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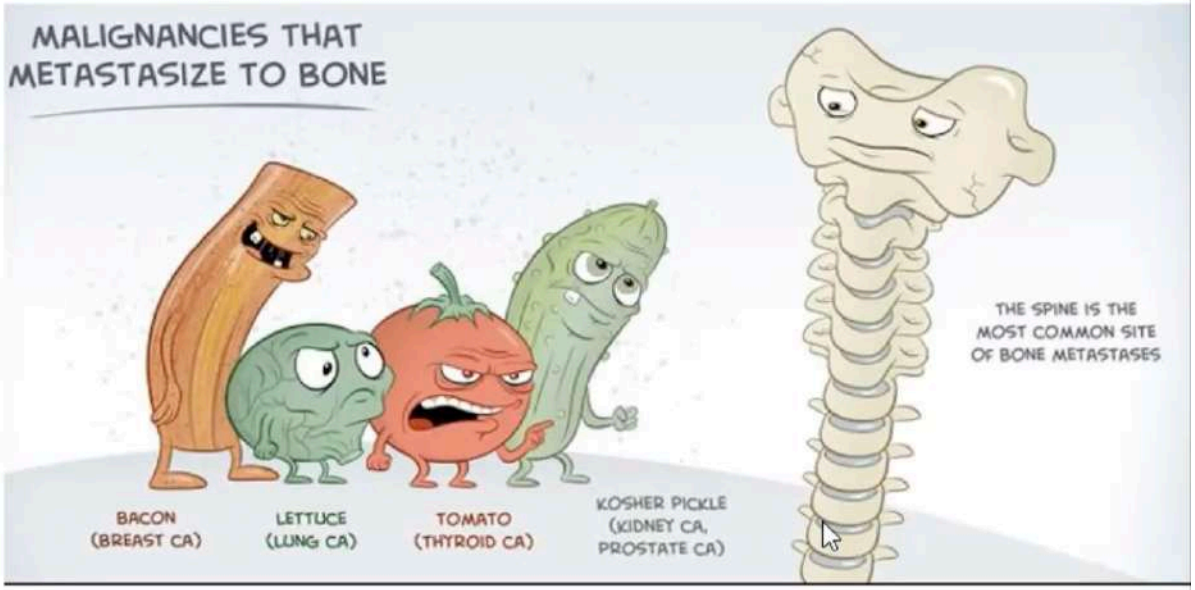
METASTATIC BONE DISEASE

- BONE IS 3RD MOST COMMON SITE AFTER LUNG & LIVER
- SPINE IS MOST COMMON SITE OF BONE METASTASIS



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METASTATIC BONE DISEASE

- BONE IS 3RD MOST COMMON SITE AFTER LUNG & LIVER
- SPINE IS MOST COMMON SITE OF BONE METASTASIS
- LUNG & KIDNEY CANCERS CAUSE ACRAL METASTASIS
- METASTATIC BONE DISEASE IS NOT A DEATH SENTENCE

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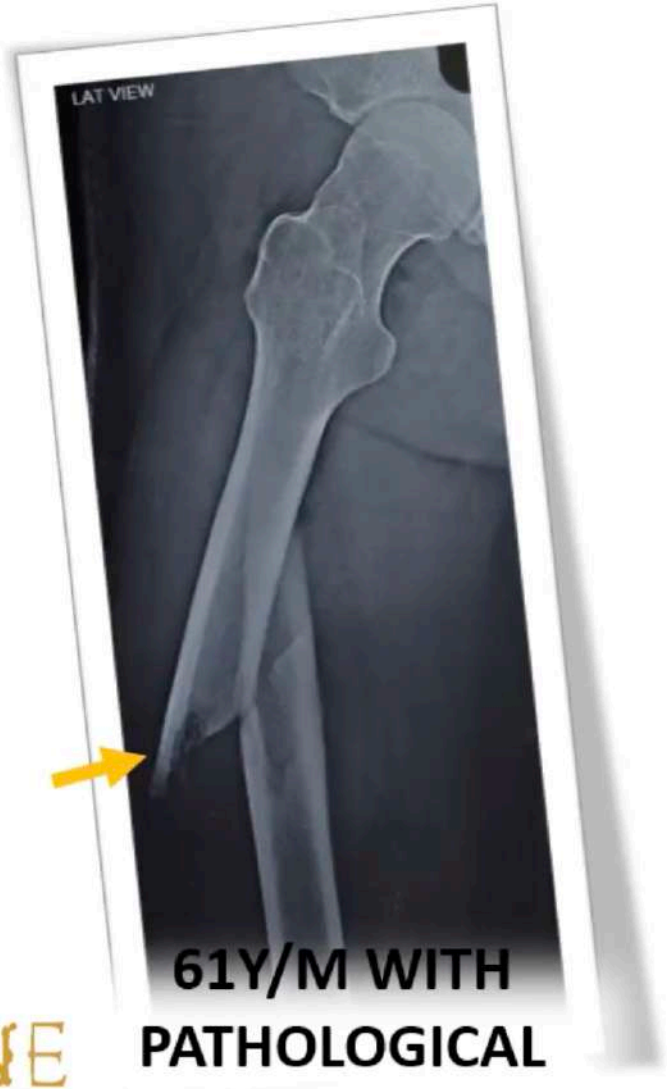

61Y/M WITH PATHOLOGICAL FRACTURE

HOW TO APPROACH ??

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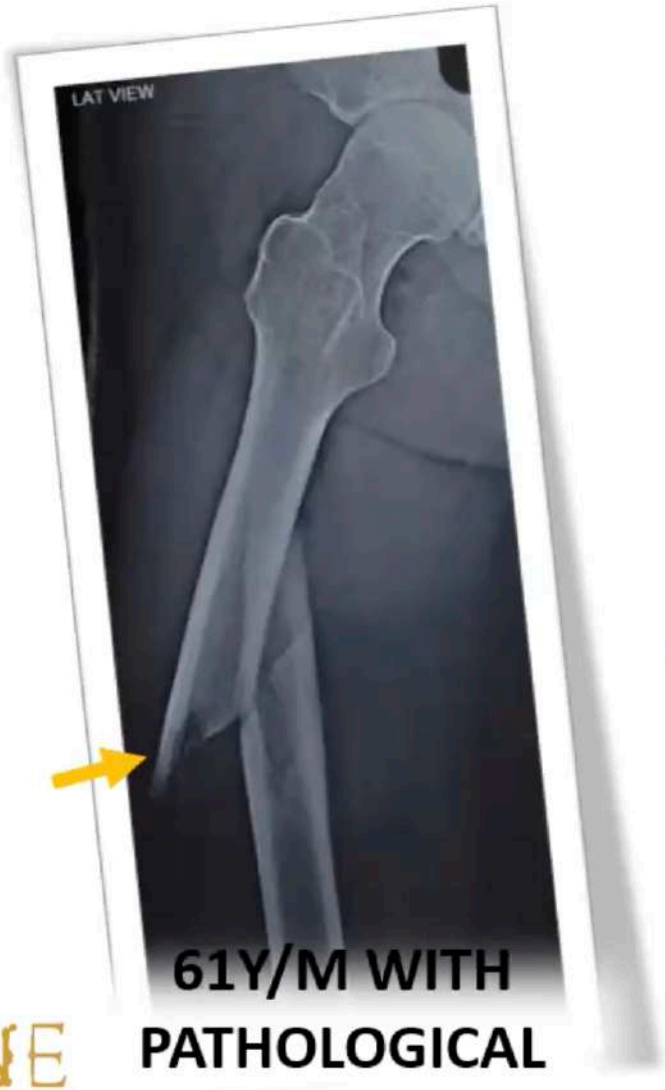
BONE CANCER CLINIC

TARGET ORTHO



61Y/M WITH PATHOLOGICAL FRACTURE

HOW TO APPROACH ??

~~1. NAILING + SENDING REAMINGS FOR HPE~~

2. SPLINTAGE & NEEDLE BIOPSY

3. FURTHER INVESTIGATIONS ??

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80 Y/ F
PAIN
KNEE
X
1 YEAR

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BONE CANCER CLINIC

TARGET ORTHO

NAILING DONE FOR PATHOLOGICAL FRACTURE

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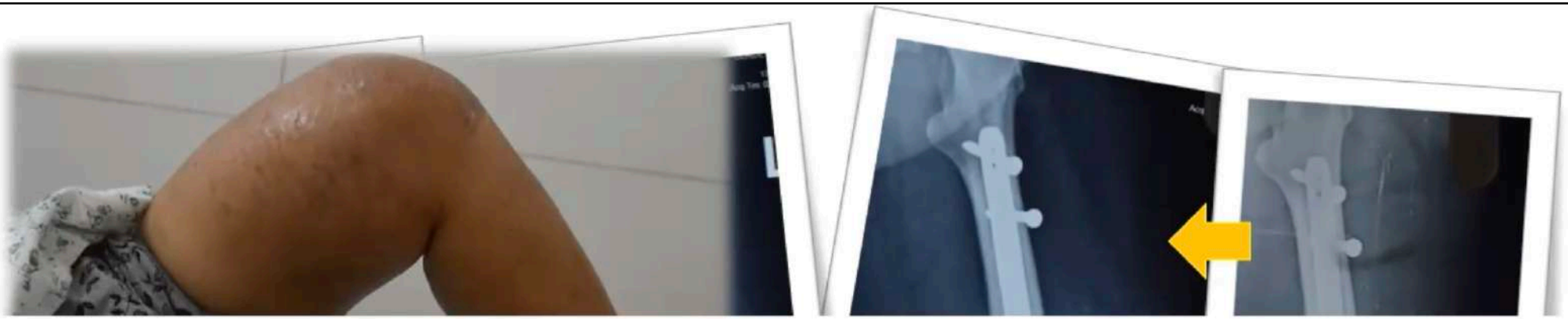
BONE CANCER CLINIC

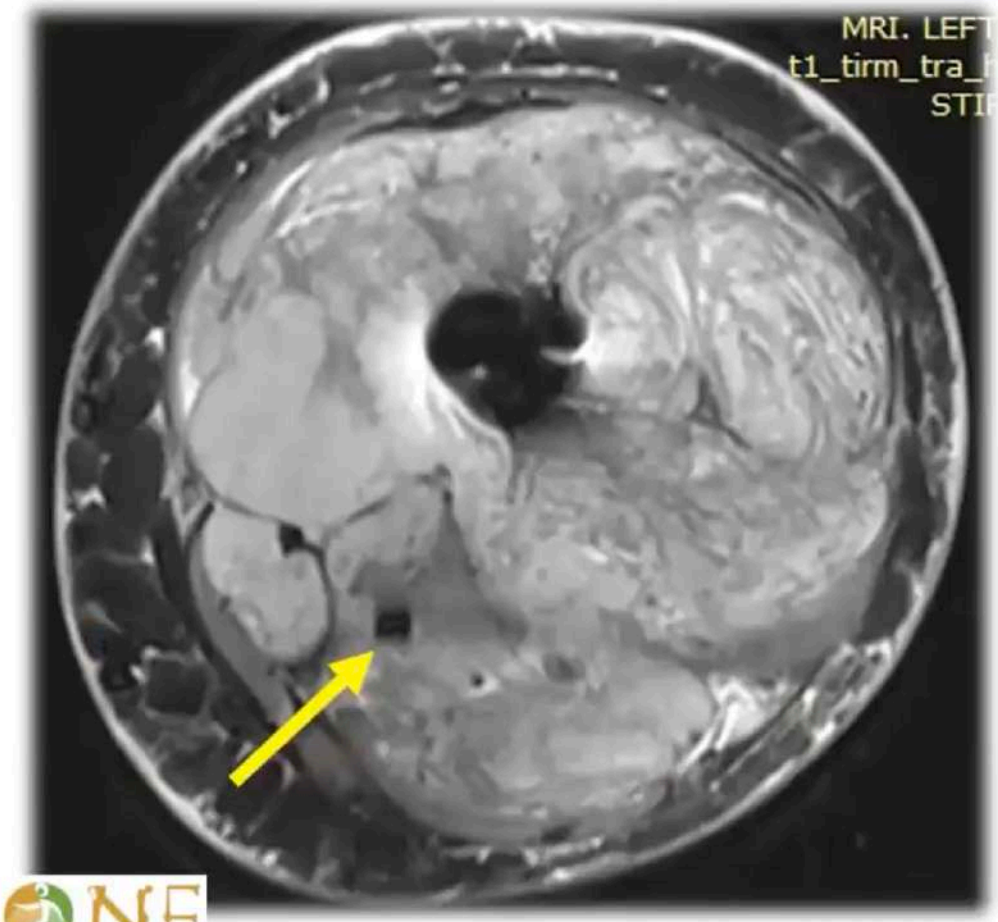
TARGET ORTHO



Distal femur biopsy : -

High grade malignant epithelioid tumor.

If the possibility of a metastatic carcinoma has been ruled out clinicoradiologically, this is consistent with an undifferentiated pleomorphic sarcoma of bone.



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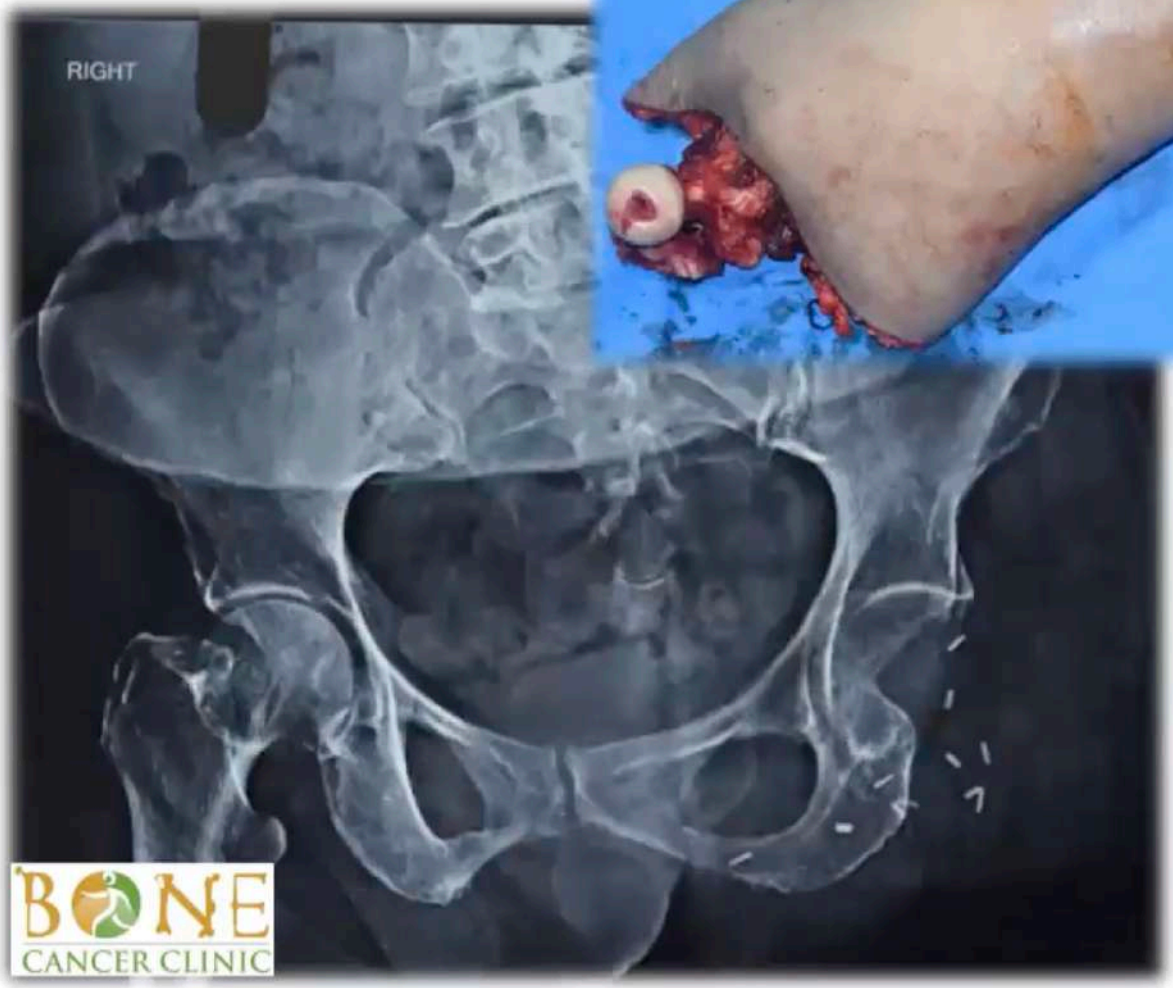
BONE CANCER CLINIC

TARGET ORTHO



HIP DISARTICULATION

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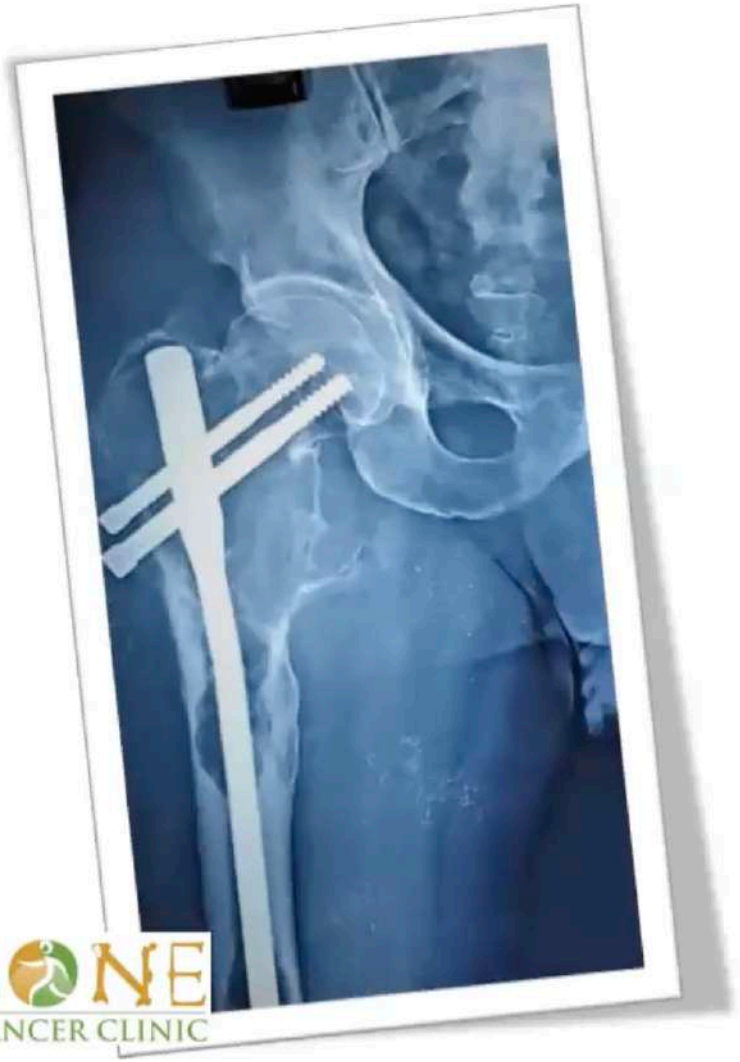
BONE CANCER CLINIC

TARGET ORTHO



65Y/M UNDERWENT NAILING FOR IMPENDING FRACTURE

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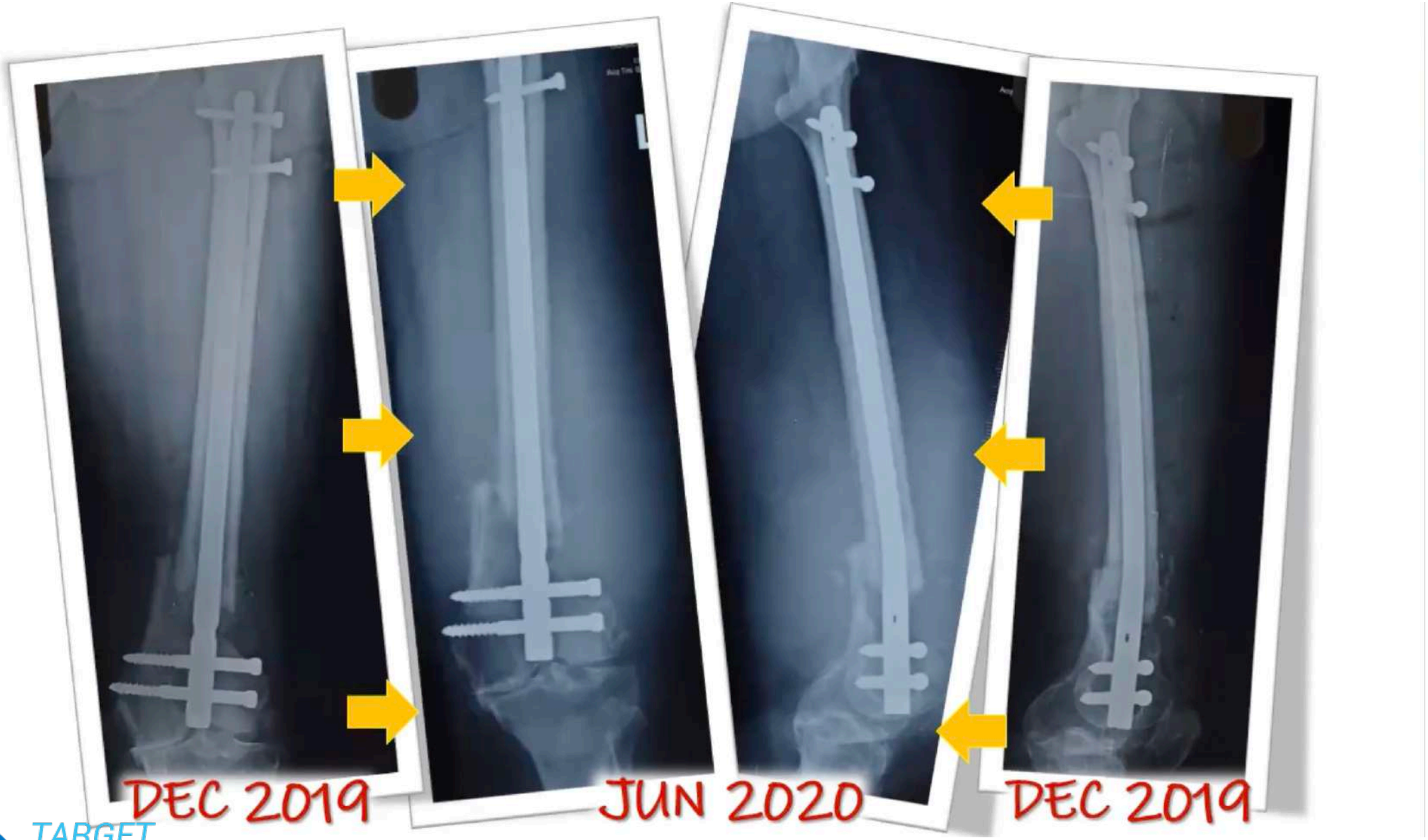

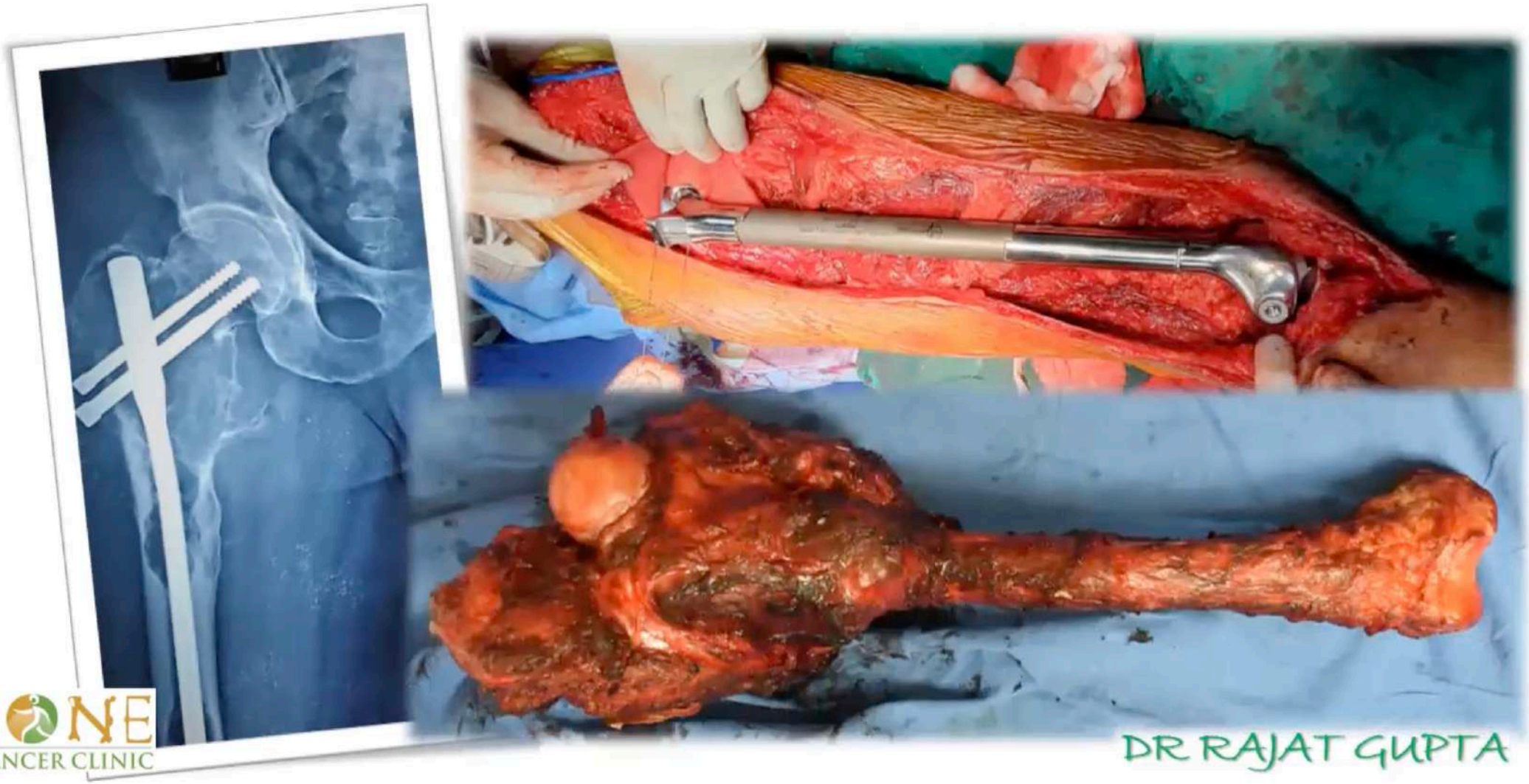

Surgeon. 2007 Aug;5(4):202-4.

Intramedullary reamings for the histological diagnosis of suspected pathological fractures.

Hassan K[1], Kalra S, Moran C.

Author information

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Abstract

The aim of this study was to evaluate how effective reamings taken at the time of surgery for fracture were in the diagnosis of malignancy. All histology reports over a five-year period were examined. Ninety cases, where reamings were taken, were identified and included. Reamings are commonly sent for histological diagnosis in orthopaedic practice. A definitive tissue diagnosis was established in 55 samples (60%). No diagnosis was established in 30 (33%), as the tissue sample was deemed inadequate, 17 of which were known to have a malignancy elsewhere. Five case reports were lost. The process by which the bone samples were obtained is believed to be very destructive, making histological diagnosis difficult and unreliable. Our study does not support the use of reamings for histology. An alternative technique should be used such as biopsy with the Harlow-Wood trephine.

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TRAUMA AND ORTHOPAEDIC SURGERY

Ann R Coll Surg Engl 2017; **99:** 452–455
doi 10.1308/rcsann.2017.0049

Diagnostic use of intramedullary reaming biopsy in metastatic long bone disease

RA Afinowi, A Chaturvedi, HR Cattermole

Hull and East Yorkshire Hospitals NHS Trust, Department of Trauma and Orthopaedic Surgery, Hull, UK

ABSTRACT

INTRODUCTION Bone is the third most common site of metastasis. A histological diagnosis is important in guiding therapy and prognosis. In up to 15% of cases of metastatic disease, the primary tumour remains unknown. This emphasises the importance of adequate, reliable and accurate sampling when performing any type of biopsy. Reaming biopsy is commonly performed during intramedullary nailing of metastatic long-bone disease but there is little published evidence on the diagnostic use and reliability of this technique.

AIMS AND METHODS We reviewed 49 cases of confirmed metastatic bone disease to determine adequacy for analysis, diagnostic accuracy and factors affecting reliability.

RESULTS Adequate tissue for histopathological analysis was obtained in 96% of cases but metastasis was confirmed in only 51% of cases. The presence of a pathological fracture had no effect on accuracy of the results but metastasis was more likely to be missed in the presence of tissue crushing and or necrosis ($P = 0.015$).

DISCUSSION This study determines the use and accuracy of bone reaming biopsy in metastatic disease and, to the best of our knowledge, is the only study determining the effect of additional factors such as the presence of a pathological fracture and tissue necrosis or crushing on the diagnostic accuracy of this technique.

CONCLUSIONS In spite of adequate tissue sampling, the diagnostic accuracy and, hence, reliability of intramedullary reaming biopsy in metastatic bone disease is less than optimal. A reaming histopathology report suggesting no evident metastasis should always be taken in clinical context.

61Y/M WITH PATHOLOGICAL FRACTURE

HOW TO APPROACH ??

PRIMARY IS KNOWN

- ✓ TYPE OF PRIMARY
- ✓ LIFE EXPECTANCY
  - EXTENT OF DISEASE
  - PREVIOUS TREATMENT RECEIVED
  - PERFORMANCE STATUS

PRIMARY IS NOT KNOWN

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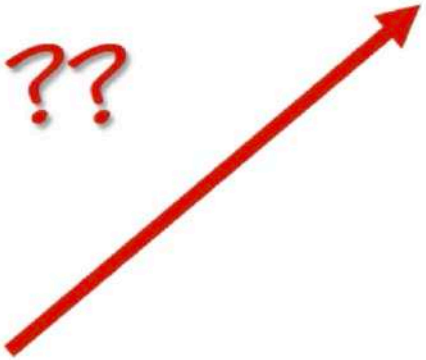
METASTATIC BONE DISEASE

HOW TO APPROACH ??

PRIMARY IS NOT KNOWN



CLINICAL HISTORY

- TOBACCO USE
- URINARY SYMPTOMS
- SWELLING / LUMP
- NON HEALING ULCER
- ANOREXIA / WEIGHT LOSS
- BLEEDING FROM ANY NATURAL ORIFICE

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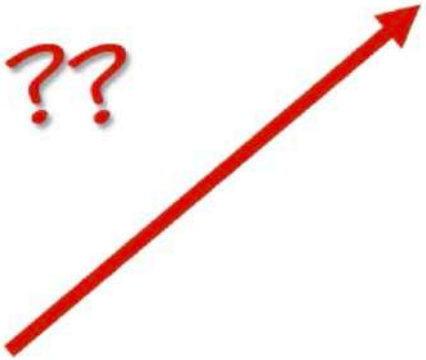
METASTATIC BONE DISEASE

HOW TO APPROACH ??

PRIMARY IS NOT KNOWN



EXAMINATION

- LYMPH NODES
- BREAST EXAMINATION (FEMALE)
- THYROID SWELLING
- PER RECTAL EXAMINATION (MALE)

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METASTATIC BONE DISEASE

HOW TO APPROACH ??

PRIMARY IS NOT KNOWN

X-RAYS

- LYTIC LESION

- LUNG
- KIDNEY
- THYROID
- GI
- UTERINE

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BONE CANCER CLINIC

TARGET ORTHO

METASTATIC BONE DISEASE

HOW TO APPROACH ??

PRIMARY IS NOT KNOWN

X-RAYS

- SCLEROTIC LESION

- PROSTATE
- BLADDER
- BRONCHIAL CARCINOID
- MEDULLARY Ca THYROID

BONE CANCER CLINIC

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METASTATIC BONE DISEASE

HOW TO APPROACH ??

PRIMARY IS NOT KNOWN

MRI

- SOFT TISSUE INVOLVEMENT
- SKIP LESIONS
- RELATION TO NVB

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CAN BE AVOIDED IN SOME CASES

BONE CANCER CLINIC

TARGET ORTHO

METASTATIC BONE DISEASE

HOW TO APPROACH ??

PRIMARY IS NOT KNOWN

BONE SCAN

- SCREENS ENTIRE SKELETON
- MORE SENSITIVE FOR OSTEOBLASTIC METS
- FALSE NEAGTIVE – RCC. MYELOMA
- FALSE POSITIVE – INFECTION. TRAUMA

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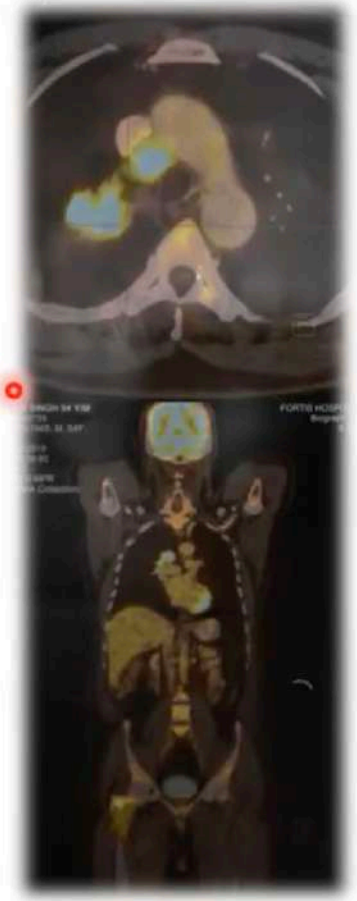
METASTATIC BONE DISEASE

HOW TO APPROACH ??

PRIMARY IS NOT KNOWN

FDG PET CT SCAN

- SCREENS ENTIRE BODY
- MORE SENSITIVE FOR LYTIC METS
- AIDS IN TUMOUR RESPONSE ASSESSMENT

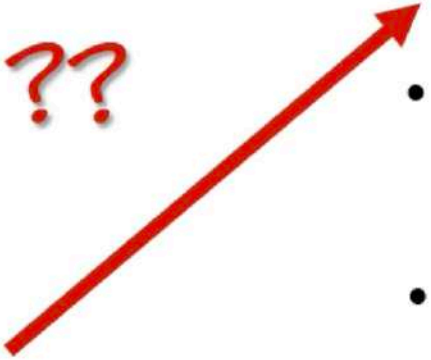


ASK FOR WHOLE BODY PET CT

METASTATIC BONE DISEASE

HOW TO APPROACH ??

PRIMARY IS NOT KNOWN



BLOOD TESTS

- MYELOMA PROFILE
- PSA LEVELS
- TUMOUR MARKERS ???

BONE CANCER CLINIC

TARGET ORTHO

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METASTATIC BONE DISEASE

HOW TO APPROACH ??

PRIMARY IS NOT KNOWN

Beta 2 microglobulin	Multiple myeloma, chronic lymphocytic leukemia
Beta hCG	Choriocarcinoma and testicular cancer
CA 15-3/ CA 27.29	Breast cancer
CA 19-9	Pancreatic, gall bladder, bile duct cancer
CA 125	Ovarian cancer
Calcitonin	Medullary thyroid cancer
CEA	Colorectal and breast cancer
Immunoglobulins	Multiple myeloma and waldenstrom macroglobulinemia
LDH	Germ cell tumors
PSA	Prostate cancer
Thyroglobulin	Thyroid cancer

METASTATIC BONE DISEASE

HOW TO APPROACH ??

PRIMARY IS NOT KNOWN

BIOPSY

- DO NOT ASSUME METASTASIS IN ELDERLY

DESPITE COMPLETE WORK UP, SITE OF PRIMARY MAY BE UNKNOWN IN 3-5%

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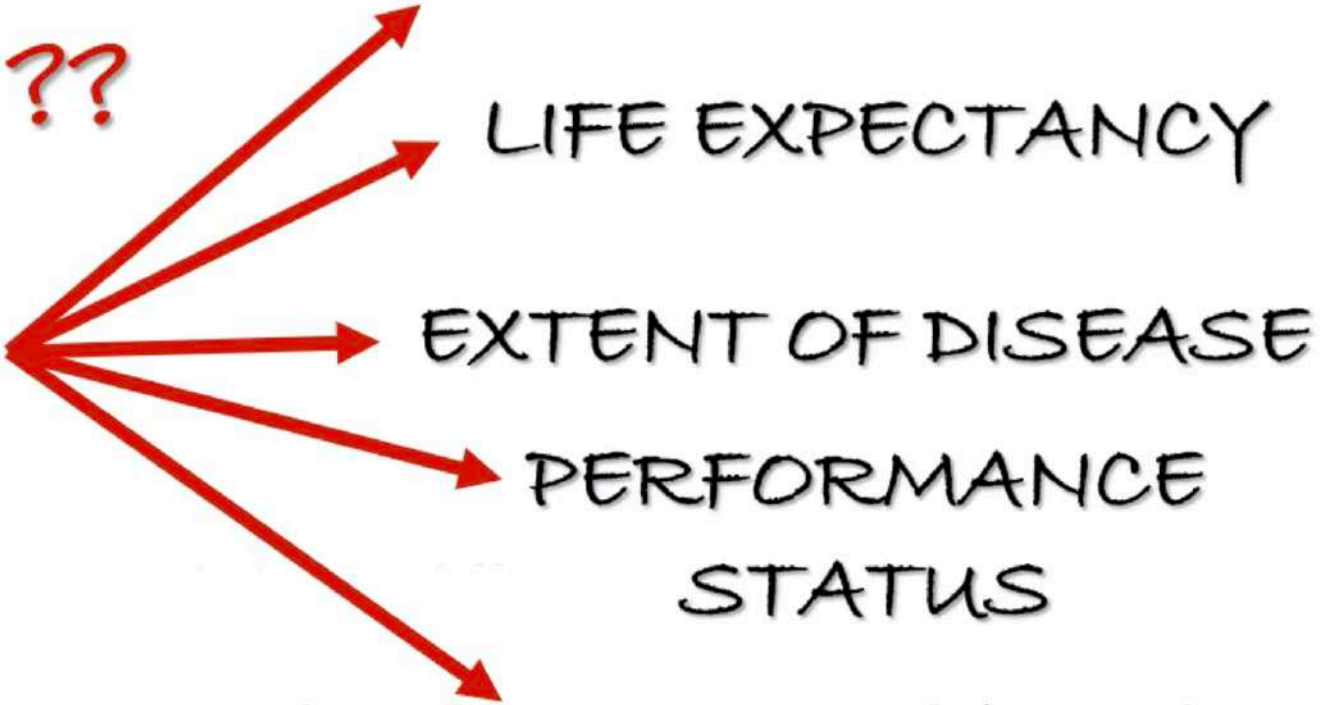
BONE CANCER CLINIC

TARGET ORTHO

METASTATIC BONE DISEASE

HOW TO APPROACH ??

PRIMARY IS KNOWN



THE JOURNAL OF BONE & JOINT SURGERY (BRITISH)

Prognostic factors and a scoring system for patients with skeletal metastasis

VOL. 87-B, No. 5, MAY 2005

H. KATAGIRI, M. TAKAHASHI, K. WAKAI, H. SUGIURA, T. KATAOKA, K. NAKANISHI

Prognostic factor		Score
Primary lesion		
Rapid growth	Hepatocellular carcinoma, gastric carcinoma, lung carcinoma	3
Slow growth	Breast carcinoma, prostate carcinoma, multiple myeloma, Malignant lymphoma, thyroid carcinoma	0
Moderate growth	Other carcinoma and sarcoma	2
Visceral or cerebral metastases		2
Performance status (ECOG)* 3 or 4		1
Previous chemotherapy		1
Multiple skeletal metastases		1

Table V. Prognostic score and survival rate (95% confidence interval) at six, 12 and 24 months

	Survival rate (mths)		
Prognostic score	**6**	**12**	**24**
0 to 2	0.979 (0.950 to 1.000)	0.891 (0.828 to 0.955)	0.753 (0.663 to 0.843)
3 to 5	0.706 (0.633 to 0.780)	0.488 (0.406 to 0.570)	0.278 (0.202 to 0.353)
6 to 8	0.313 (0.224 to 0.401)	0.109 (0.049 to 0.169)	0.023 (0.000 to 0.053)

Primary lesion		
Rapid growth	Hepatocellular carcinoma, gastric carcinoma, lung carcinoma	3
Slow growth	Breast carcinoma, prostate carcinoma, multiple myeloma, Malignant lymphoma, thyroid carcinoma	0
Moderate growth	Other carcinoma and sarcoma	2
Visceral or cerebral metastases		2
Performance status (ECOG)* 3 or 4		1
Previous chemotherapy		1
Multiple skeletal metastases		1

Tomita

Score	Prognostic factors		
	Primary tumor	Visceral metastases	Bone metastases
1	Slow growth (Breast/ Thyroid)	----------	Solitary/isolated
2	Moderate growth(Kidney/ uterus)	Treatable	Multiple
4	Rapid growth (Lung, Stomach)	Untreatable	----------

Interpretation- Score 2-3: Wide or marginal excision (Long term local control)
Score 4-5: Marginal or intralesional excision- (Middle term local control)
Score 6-7: Palliative surgery (Short term local control)
Score 8-10: Supportive care (Terminal)

Modified Bauer scoring System

Score	Prognostic factor
1	No visceral metastsis
1	No lung cancer
1	Primary tumor (Breast/ idney/ Lymphoma/ Multiple
1	One solitary skeletal metastasis

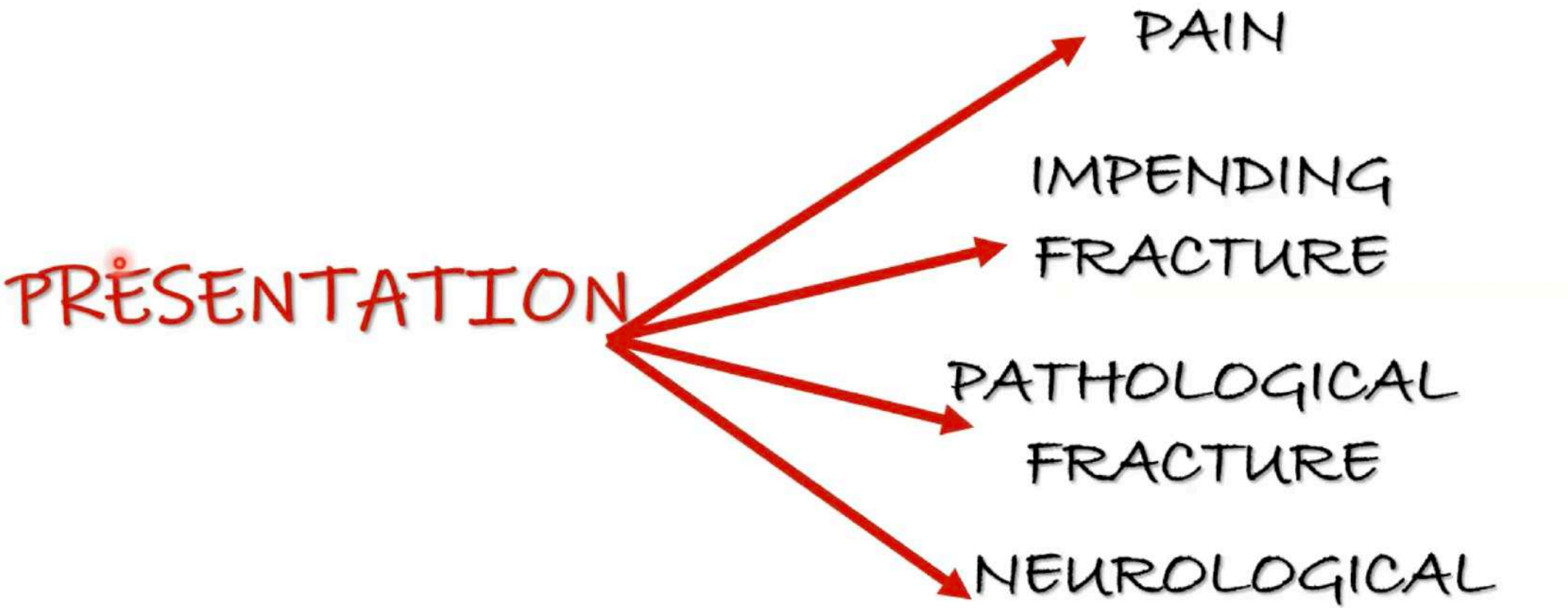
nterpretation- Score 0-1: No surgery (Supportive care)
Score 2: Dorsal approach surgery (Short term palliation)
Score 3-4: Ventral- dorsal approach surgery (Middle term local control)

Tokuhashi

Variable	Score
General Condition (KPS)	
Poor (10- 40%)	0
Moderate (50- 70%)	1
Good (80- 100%)	2
No. of extraspinal bone metastases	
>/= 3	0
1-2	1
0	2
No. of metastases in vertebral body	
>/= 3	0
1-2	1
0	2
Metastases in major internal organs	
Irremovable	0
Removable	1
No metastases	2
Primary site of cancer	
Lung, stomach	0
Kidney, liver, uterus	1
Other, unidentified, thyroid, prostate, breast, rectum	2
Spinal cord palsy	
Complete	0
Incomplete	1
None	2

Interpretation- Score 0-8: Predicted prognosis- < 6 months- Conservative T/t/ Palliative surgery
Score 9- 11- Predicted prognosis- >/ = 6 months- Palliative surgery / excisional surgery
Score 12- 15- Predicted prognosis- >/ = 1 year- Excisional surgery

METASTATIC BONE DISEASE



AIM OF TREATMENT

- TO IMPROVE QUALITY OF LIFE
  PAIN FREE
  MOBILITY
- LAST SURGERY FOR THAT BONE

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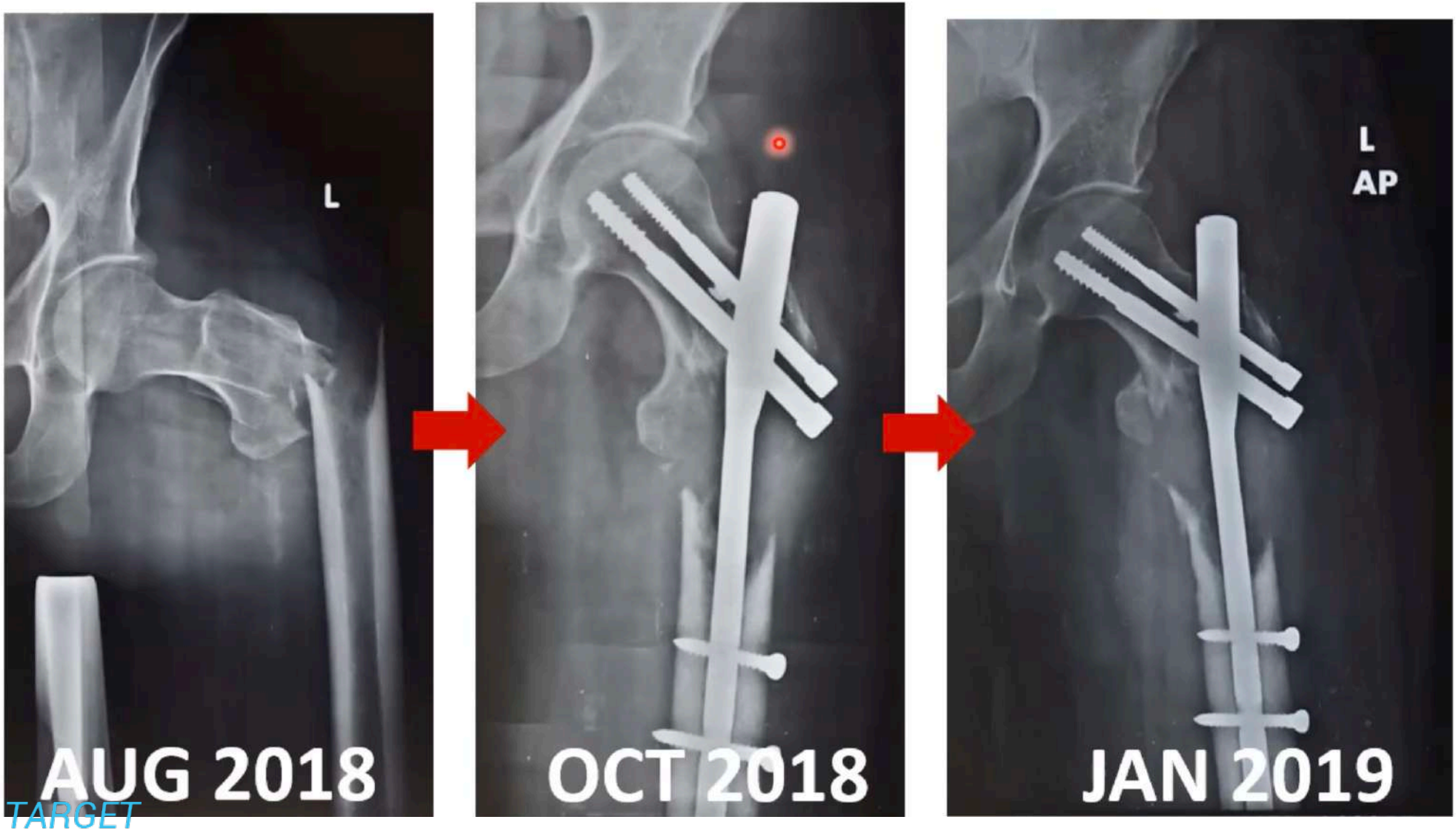
PATH # PROXIMAL FEMUR SEC TO RCC



RATE OF PATHOLOGICAL FRACTURE HEALING

67% MYELOMA

44% RCC

37% BREAST

0% LUNG

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AIM OF TREATMENT

- PATIENT SHOULD BE ABLE TO USE THAT LIMB ASAP

- TO IMPROVE QUALITY OF LIFE
  PAIN FREE
  MOBILITY
- LAST SURGERY FOR THAT BONE
- IMPLANT SHOULD OUTLIVE PATIENT

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MODALITIES OF TREATMENT

- SURGERY
- BONE STRENGTHENING AGENTS
- RADIATION THERAPY
- SYSTEMIC THERAPY

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MODALITIES OF TREATMENT

- SURGERY

  - LIFE EXPECTANCY SHOULD BE MORE THAN REHABILITATION PHASE

  - PATIENT SHOULD BE BACK TO HIS ROUTINE ACTIVITIES ASAP

  - CONSTRUCT SHOULD OUTLIVE THE PATIENT

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MODALITIES OF TREATMENT

- SURGERY
  - RESECTION
    - SOLITARY MET
    - DOES NOT ADD TO MORBIDITY
    - FAILED INTRALESIONAL SURGERY
  - INTRALESIONAL
    - MAY REQUIRE POST OP RT

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MODALITIES OF TREATMENT

- BONE STRENGTHENING AGENTS

DENOSUMAB
(120 MG SC MONTHLY)

ZOLENDRONIC ACID
(4 MG IV MONTHLY)

BONE CANCER CLINIC

TARGET ORTHO

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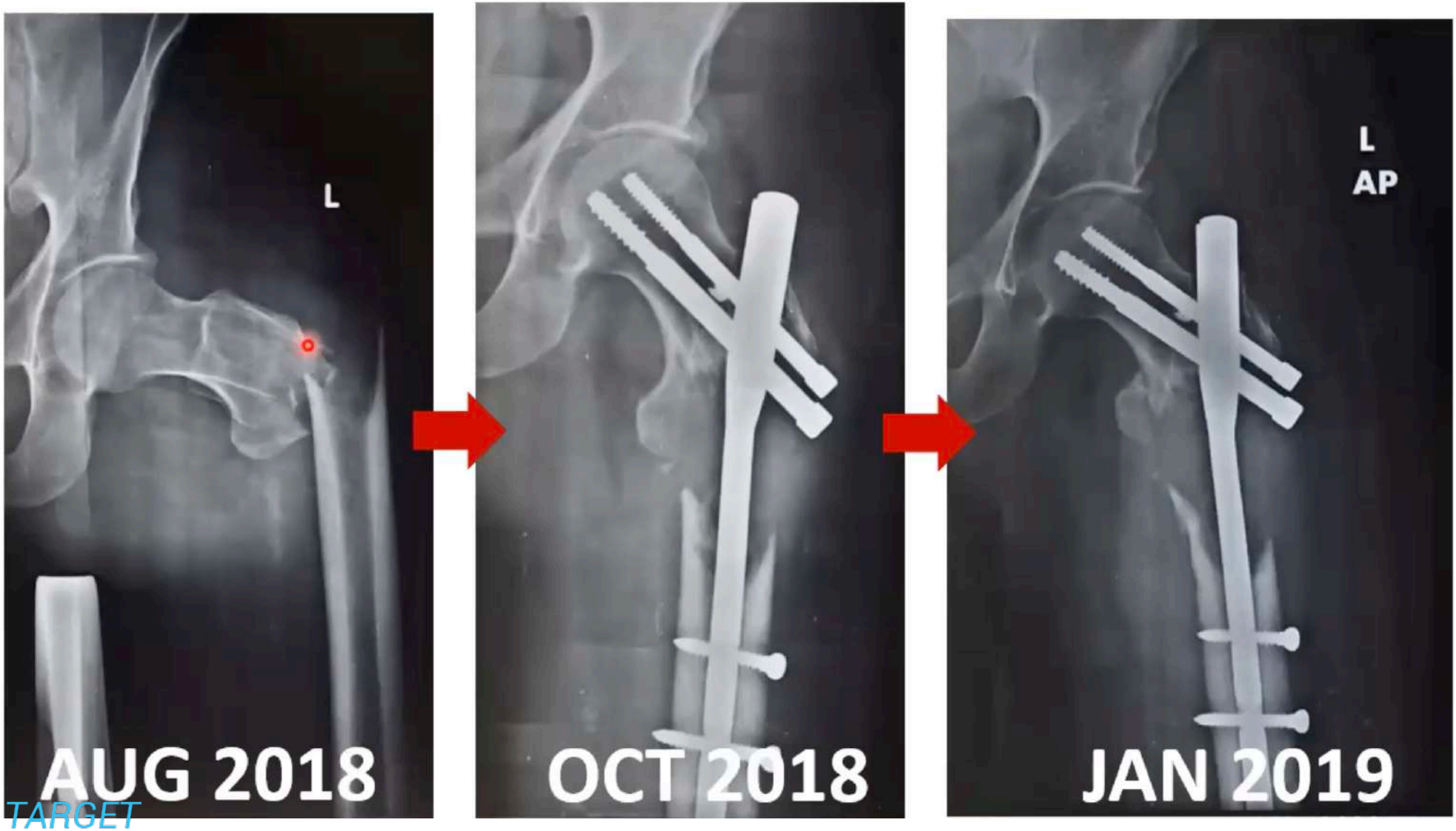
PATH # PROXIMAL FEMUR SEC TO RCC



MODALITIES OF TREATMENT

- RADIATION THERAPY
  - PAIN
  - TUMOUR CONTROL

  - 8Gy/1# or
  - 30Gy/10#

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MODALITIES OF TREATMENT

- SYSTEMIC THERAPY
  - HORMONAL THERAPY
  - CHEMOTHERAPY
  - IMMUNOTHERAPY

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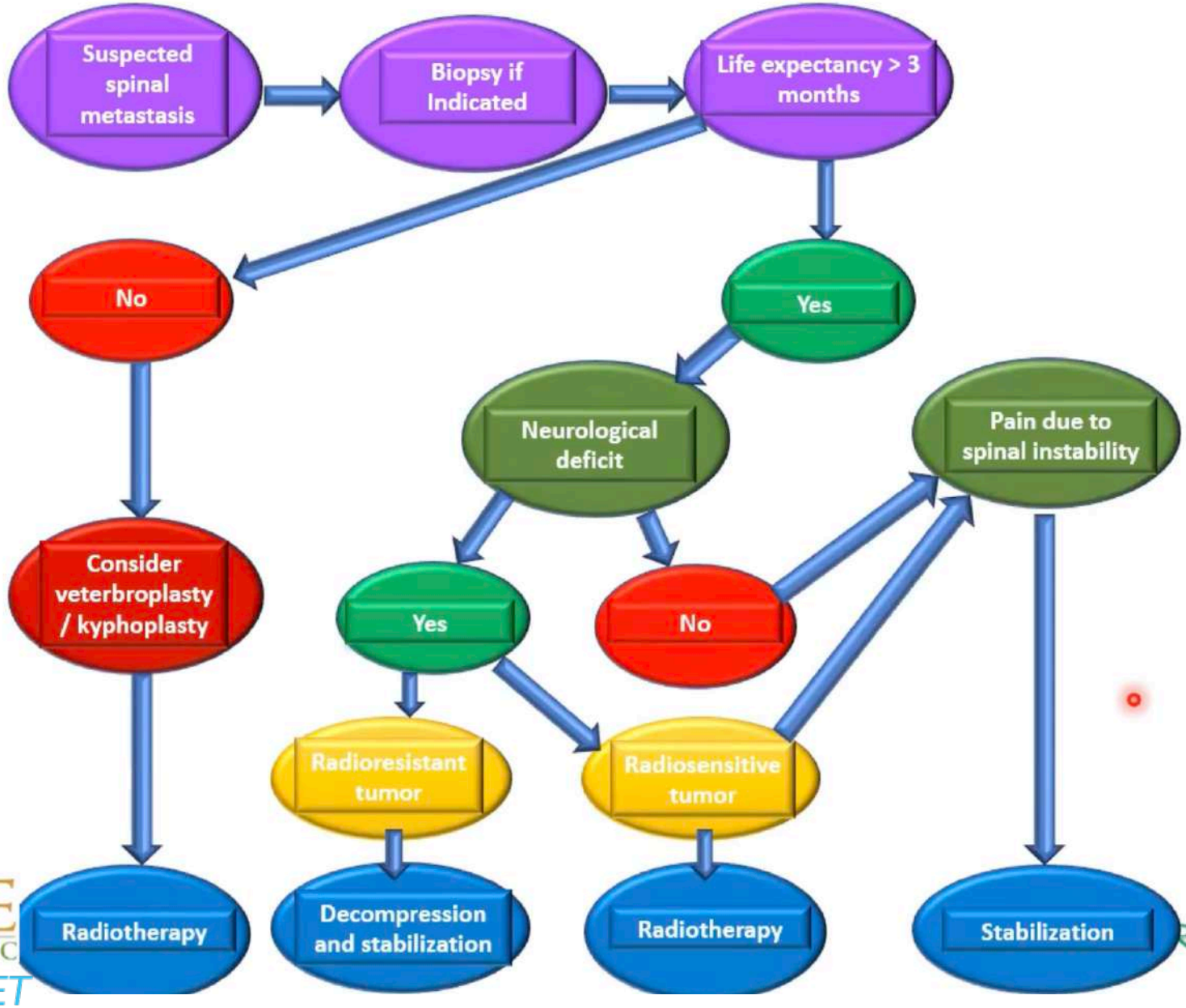

61Y/M METASTATIC CA PROSTATE

HOW TO APPROACH ??

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FIXATION WITH CEMENT AUGMENTATION FOLLOWED BY RT & SYSTEMIC THERAPY + DENOSUMAB

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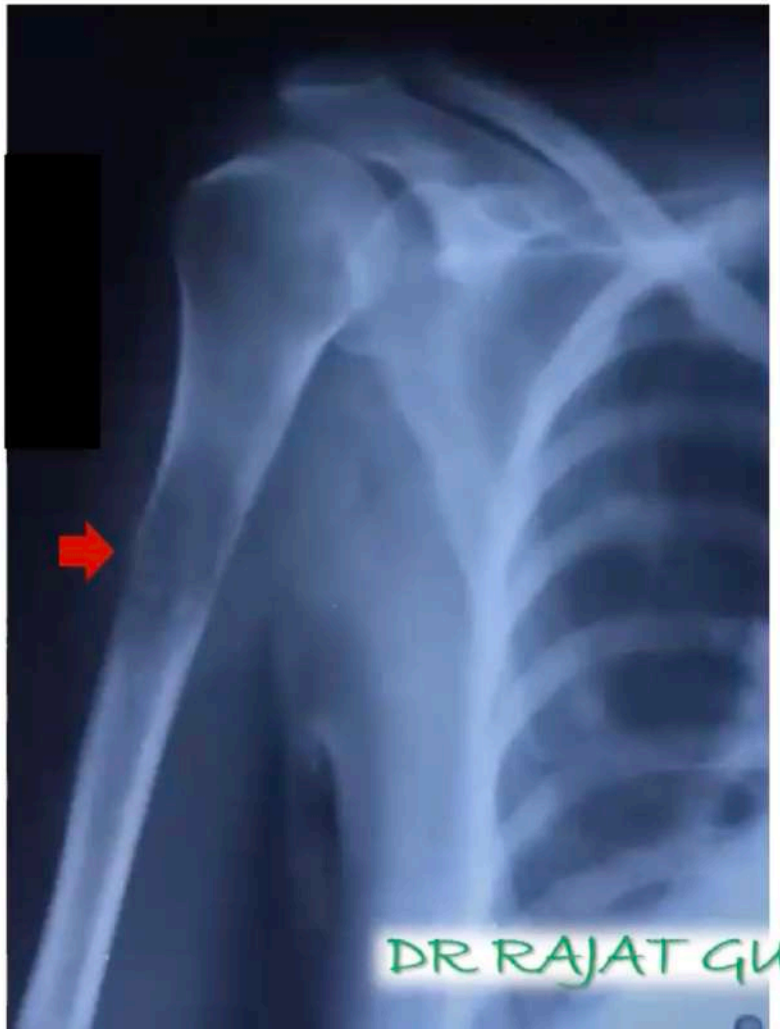
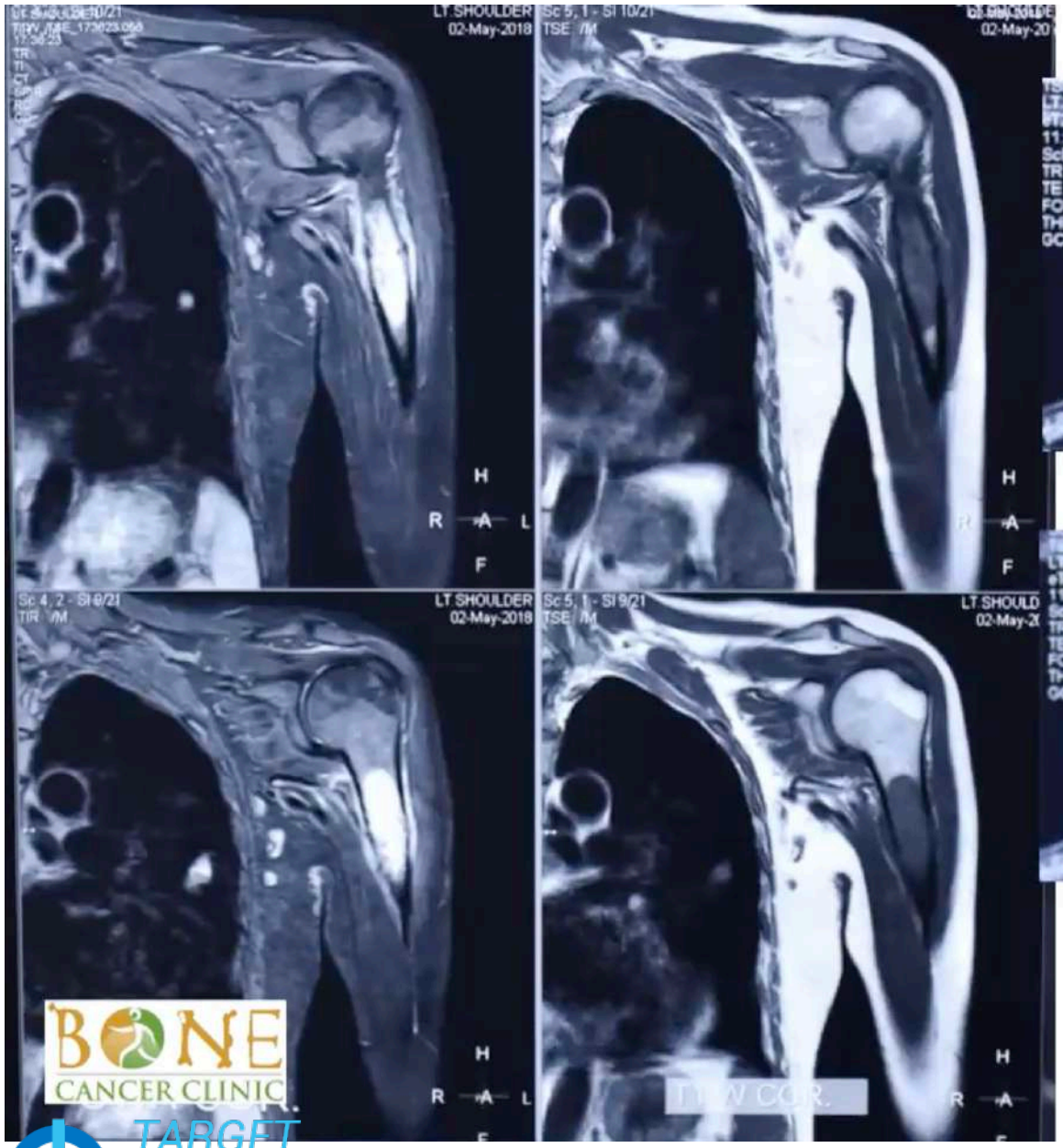
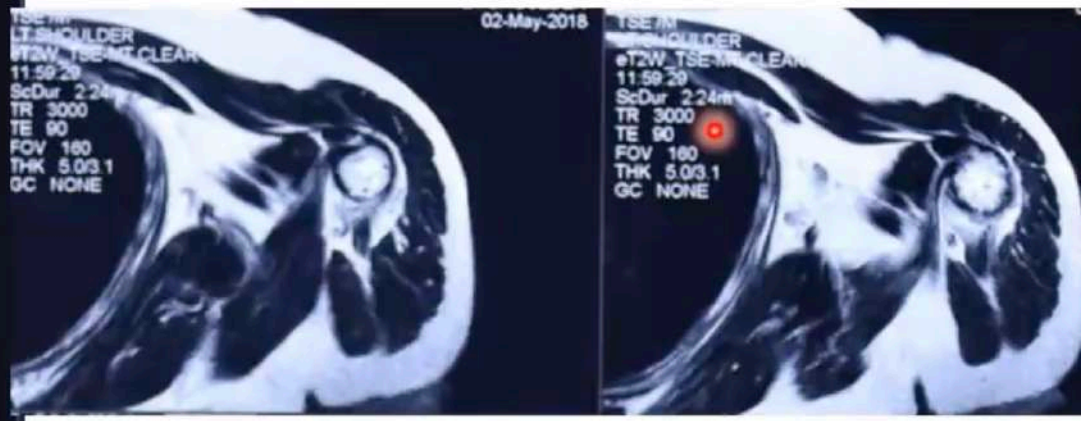
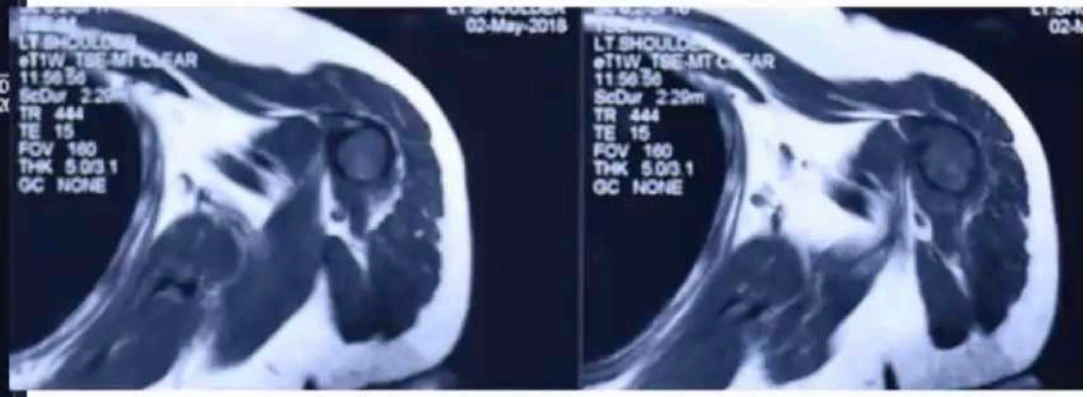
55Y/F with h/o pain left arm for 2-3 months









BONE CANCER CLINIC

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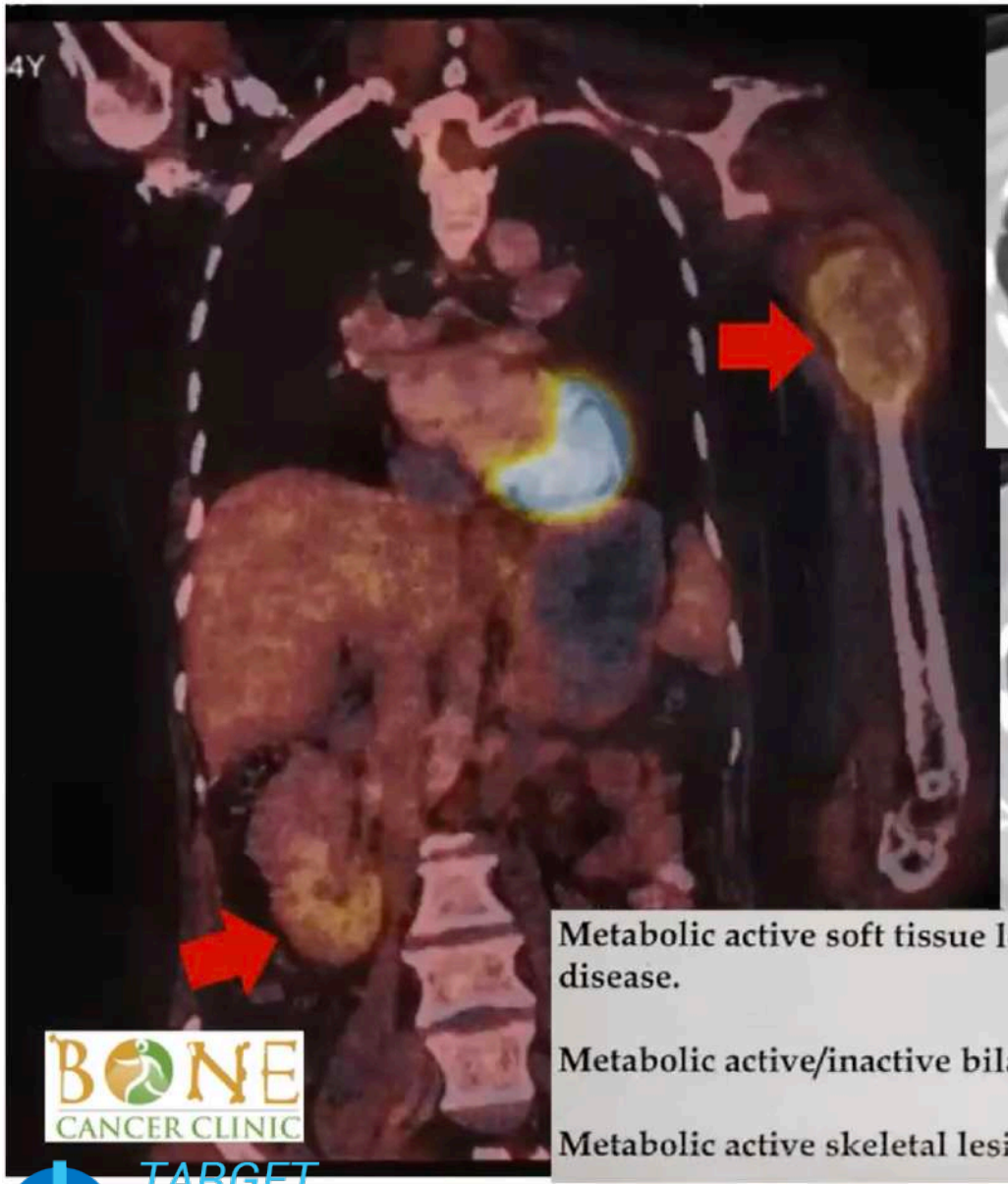

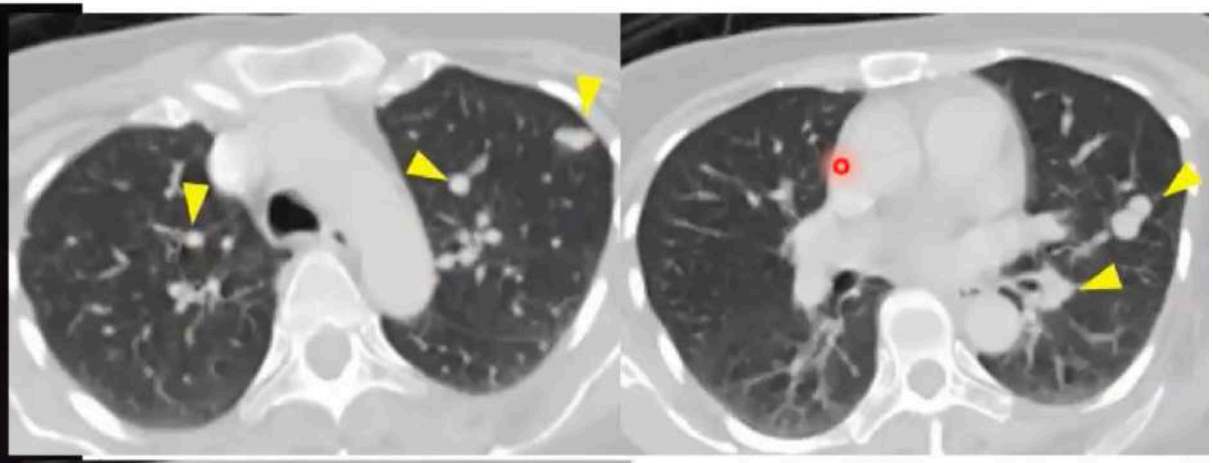

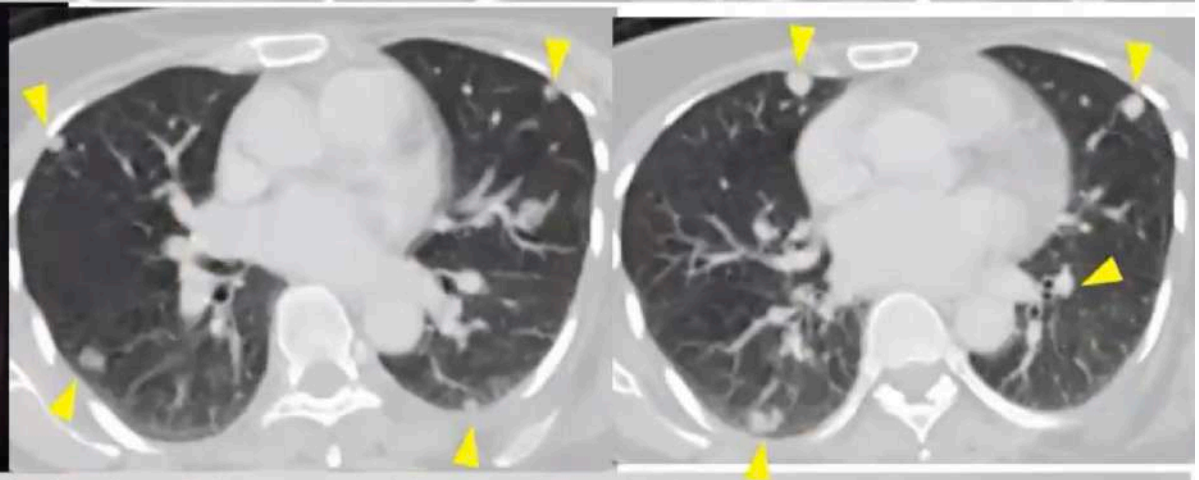

Metabolic active soft tissue lesion involving right kidney as described – appears primary malignant disease.

Metabolic active/inactive bilateral pulmonary nodules - metastatic.

Metabolic active skeletal lesion (left humerus) - metastatic.

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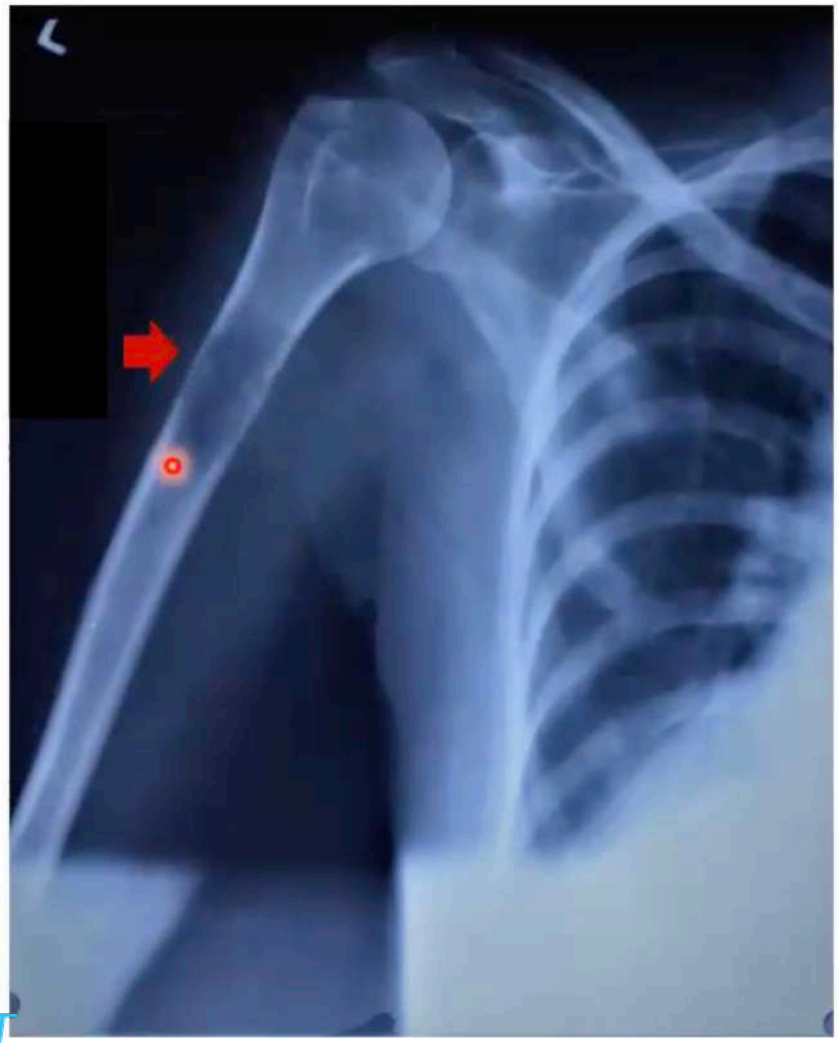
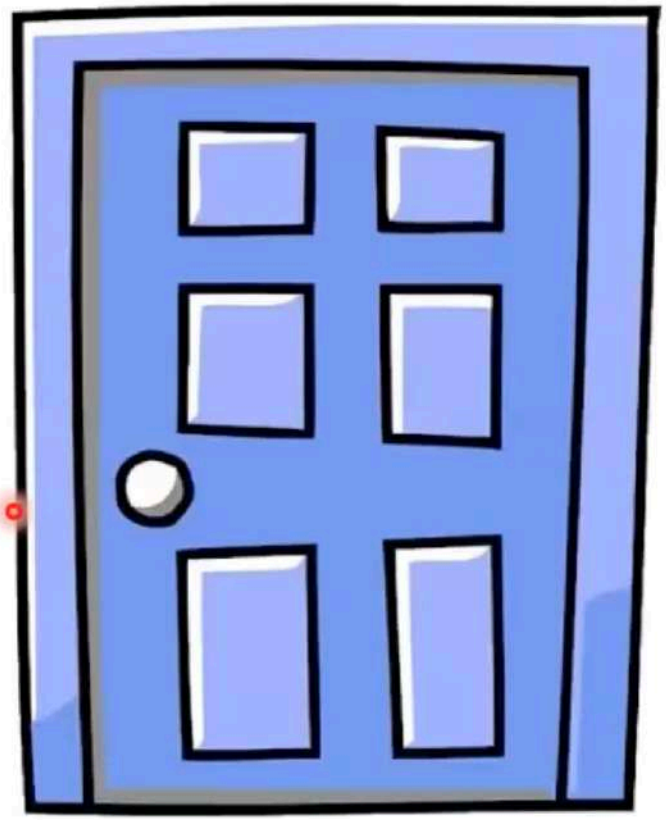
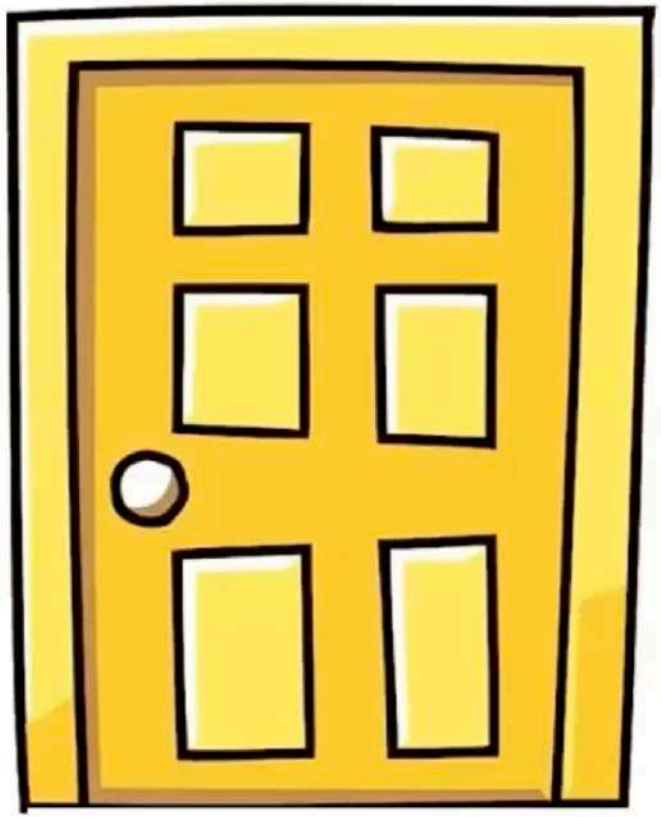
55Y/F with h/o pain left arm for 2-3 months



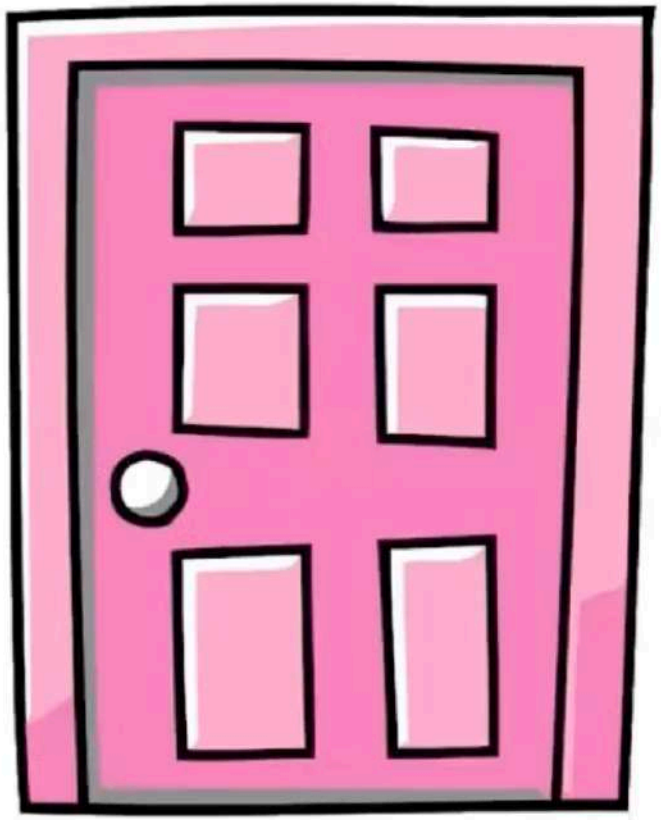
Metastatic RCC with painful humeral lesion



SYSTEMIC THERAPY



RADIATION THERAPY



SURGERY

TREATMENT PLAN

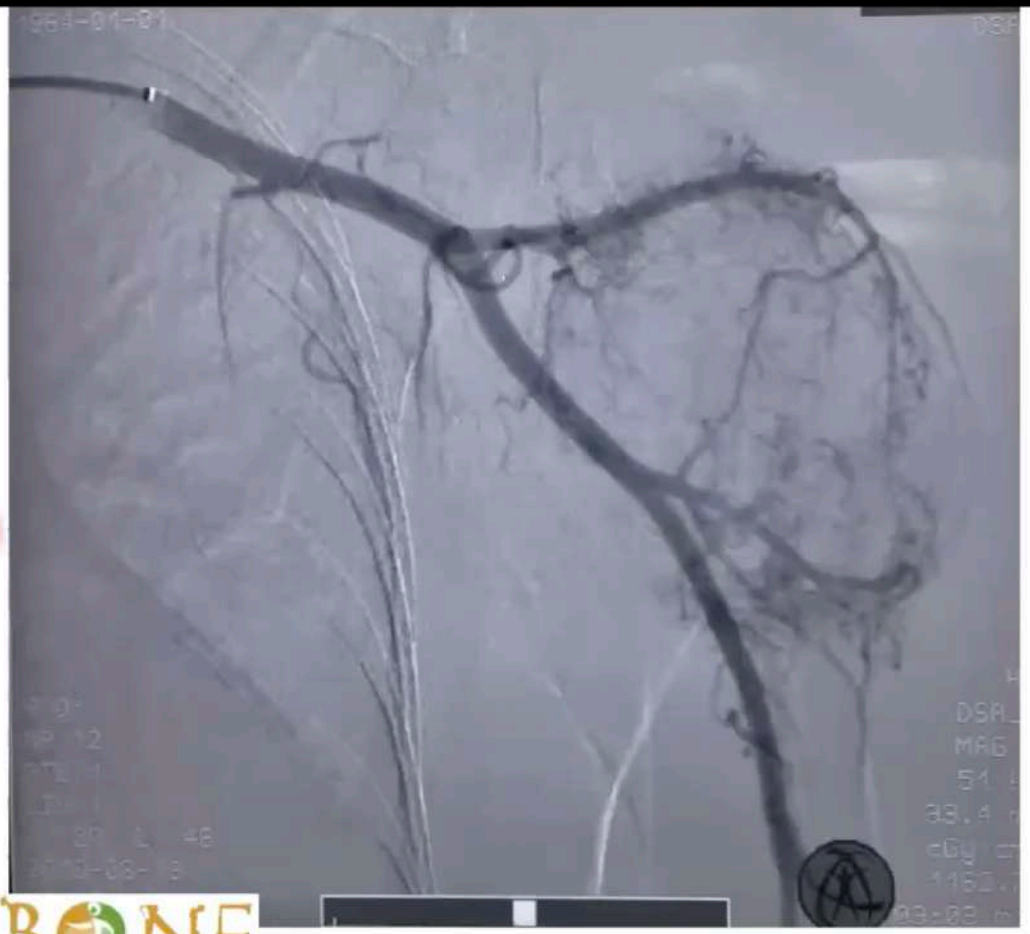
INTERCALARY
RESECTION

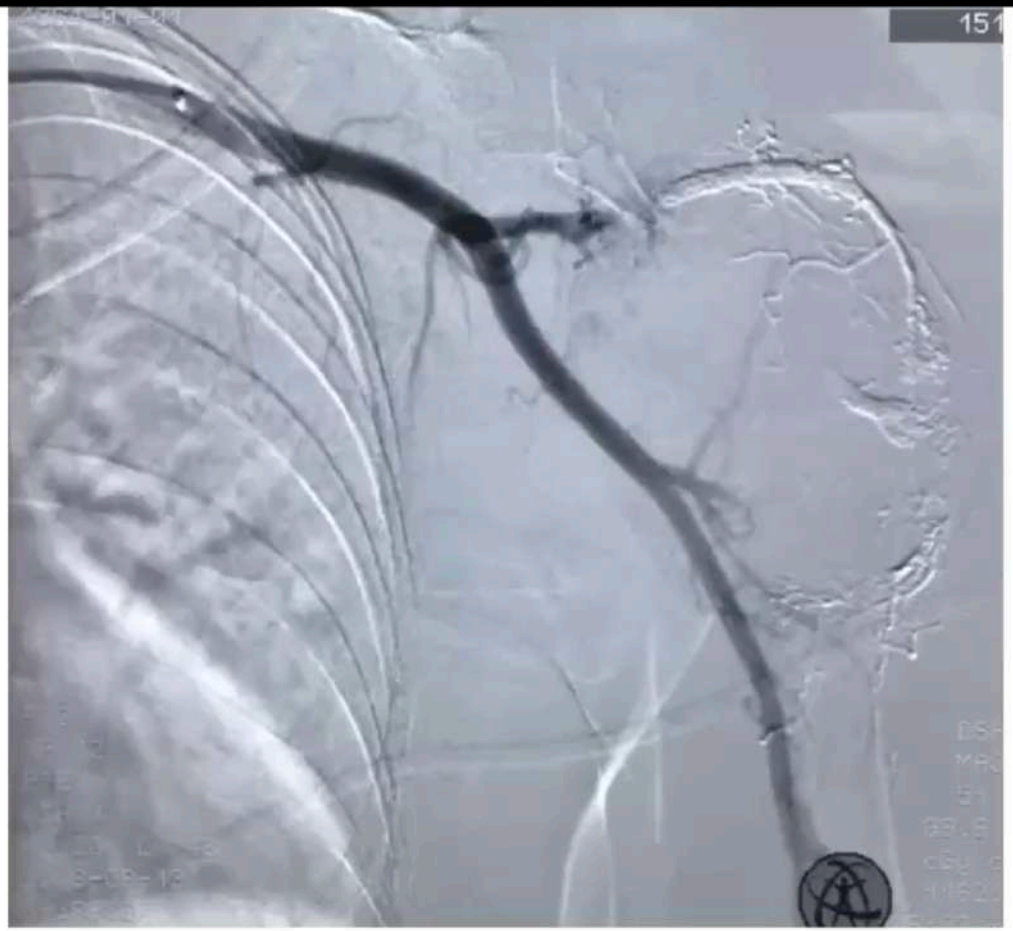
+

NAIL PLATE
CEMENT SPACER
RECONSTRUCTION

PALLIATIVE
INTENT

PRE OP EMBOLISATION





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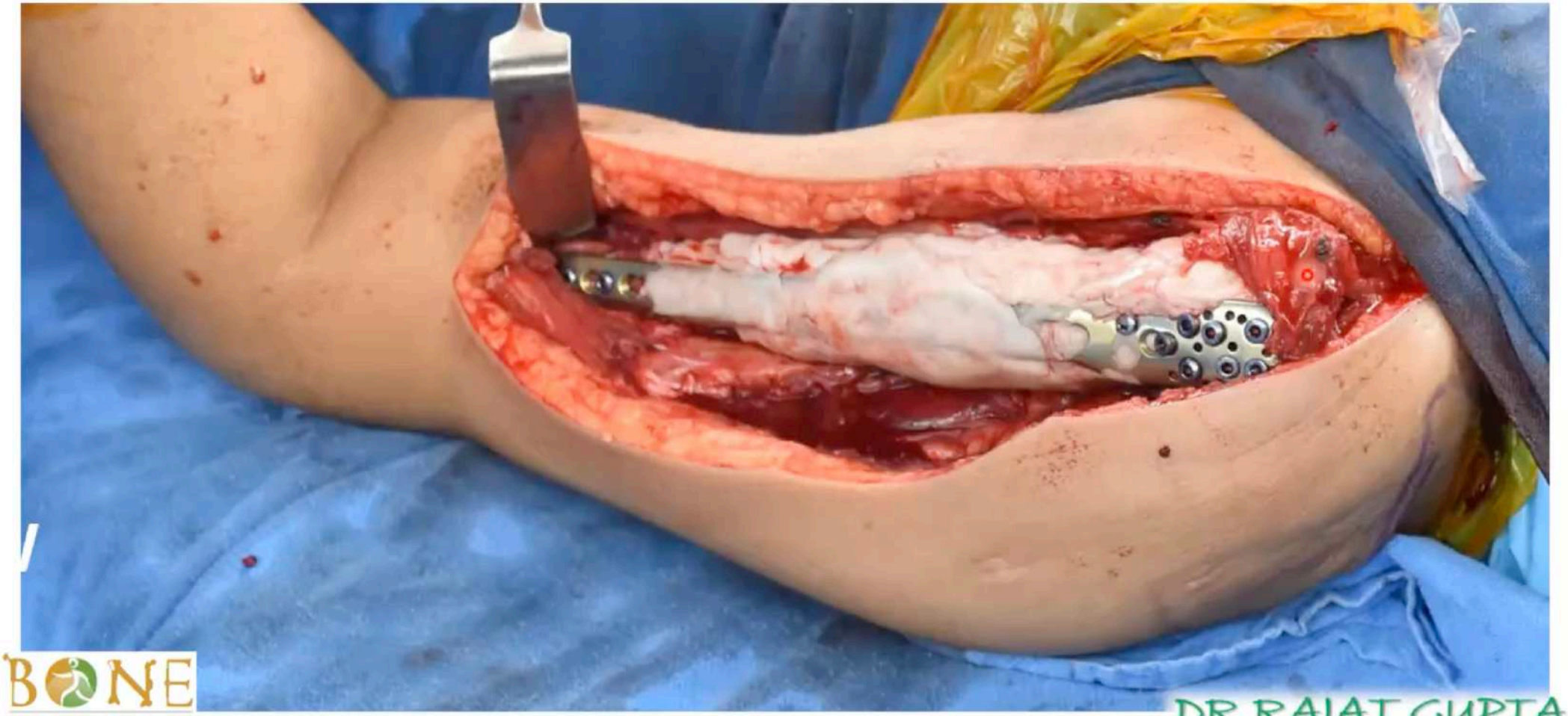
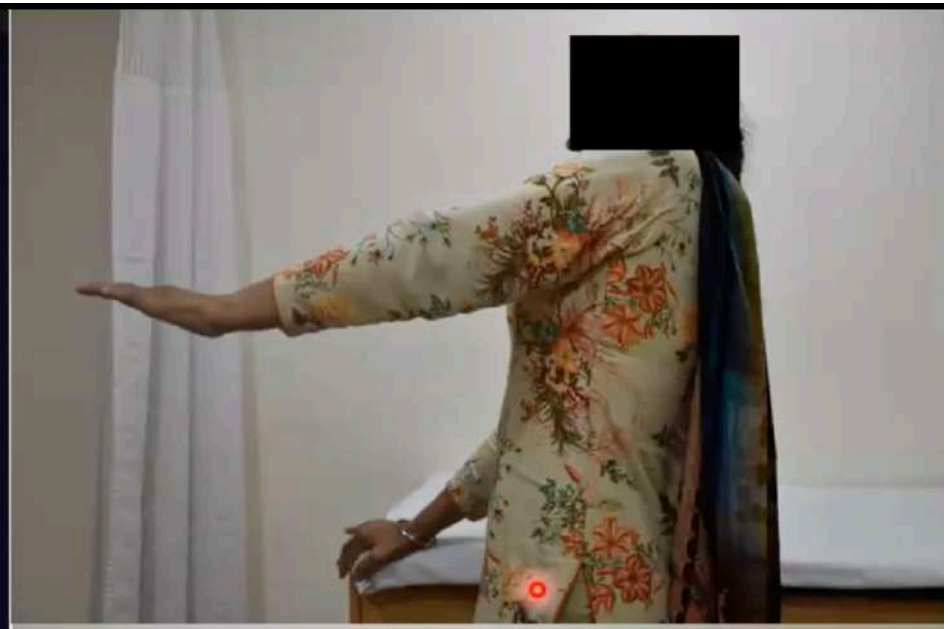
BONE CANCER CLINIC

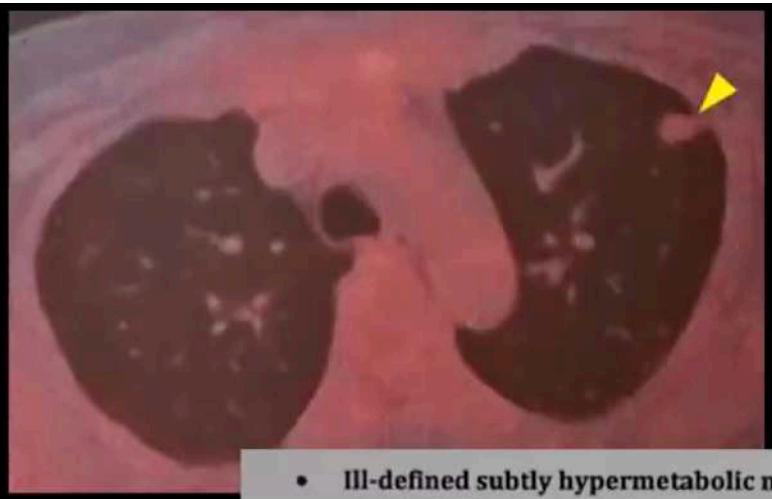
TARGET ORTHO

AFTER PLATE AUGMENTATION





FUNCTION AT 6 MONTHS

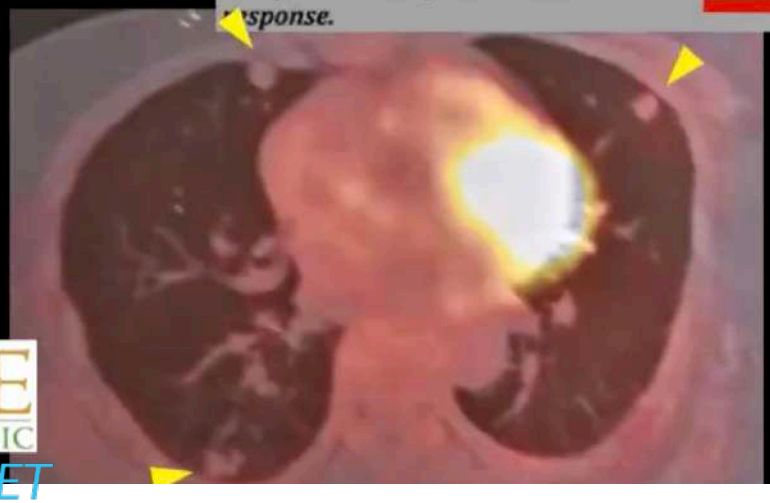


BEFORE

- Ill-defined subtly hypermetabolic mass arising from the right kidney, as described – suggestive of residual primary pathology.
- Few non-hypermetabolic pulmonary nodules, as described – suggestive of residual pulmonary metastases.
- Post-surgical changes in the left humerus.

Compared to the previous scan there is decrease in the number of pulmonary lesions – suggestive of partial response.

AFTER



BONE CANCER CLINIC

DR RAJAT GUPTA

78Y/M METASTATIC RCC

DR RAJAT GUPTA

56Y/M PAIN HIP X 6 MONTHS

HOW TO APPROACH ??

DR RAJAT GUPTA

56Y/M PAIN HIP X 6 MONTHS

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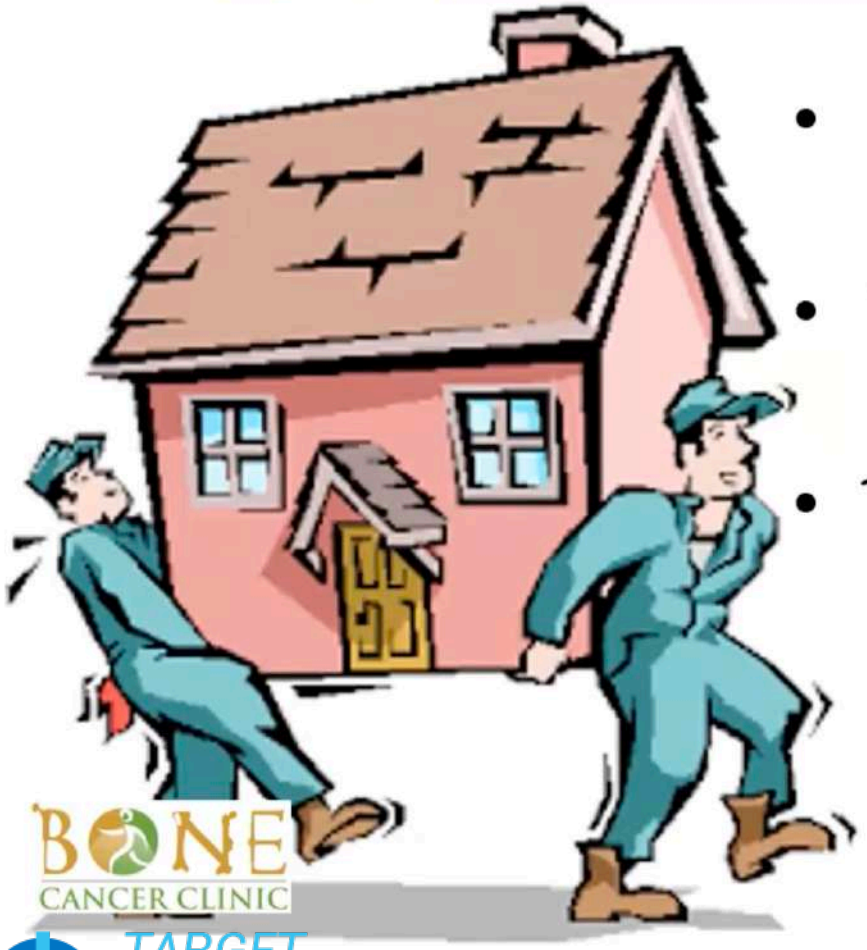
TARGET ORTHO

THE TAKE-HOME MESSAGE



- Metastatic disease is not a death sentence
- Implant construct should outlive the patient
- Rehabilitation period should not be longer than the life expectancy

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BONE CANCER CLINIC

TARGET ORTHO