

# CyberKnife Case Studies by Apollo Hospitals

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The CyberKnife treatment at Apollo Hospitals makes Cancer treatment more precise, faster, safer, and far more comfortable for all patients.



# CyberKnife®

## Case Studies

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# Case Study 1

## Cerebellopontine Angle Haemangioblastoma Successfully Treated with CyberKnife®

### CASE HISTORY

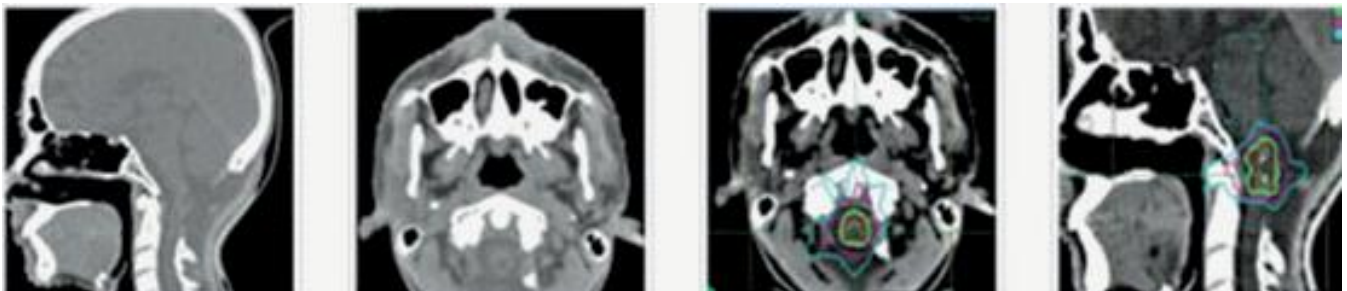
A 15-year-old boy was presented to [Apollo Speciality Cancer Hospital](#) with complaints of neck pain, tingling sensation and weakness of upper limbs for the past 2 weeks. MRI of the brain and MR angiogram showed an expansile mass in the left cerebellopontine (CP) region. The patient was diagnosed with haemangioblastoma.

Craniotomy was planned as management measure. During the surgery, surgeons found that tumour was highly vascularised, adherent to medulla hence further surgical intervention was not done and patient was referred for CyberKnife®.

The patient was treated with CyberKnife® at a total dosage of 21 Gy in three fractions (7 Gy/Fr) to the target. The patient tolerated the treatment well. A significant improvement in the clinical symptoms and a significant decrease in the contrast-enhancing solid mass were observed in the third month following the treatment. Currently, the patient is doing well and is on regular follow-up.

### DISCUSSION

Optic nerve sheath meningiomas are benign tumours arising from the optic nerve sheath and are surrounded by numerous critical structures. Fractionated radiation therapy with CyberKnife® provides highly conformal dose distribution in these critically located tumours.



Pre-CyberKnife®

# Case Study 2

## CyberKnife® for Hypothalamic Hamartoma

### CASE HISTORY

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A 17-year-old male presented to Apollo Speciality Cancer Hospital with complaints of intractable headache, vomiting and intermittent episodes of 'gelastic (laughing)' seizures for the past 2 months. MRI of the brain showed a large mass in the hypothalamic region with moderate hydrocephalus. Hydrocephalus was managed with a VP shunt. Biopsy was consistent with a neuronal hamartoma.

### DISCUSSION

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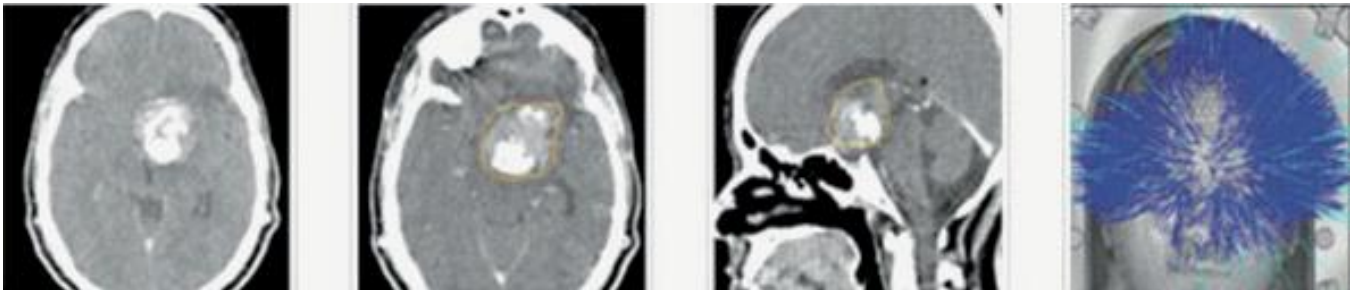
Generally, patients having solitary (single) or 'oligo metastasis' (3 metastases) with otherwise good general health and controlled primary disease are treated with curative intent. Surgery (metastectomy) is the preferred treatment. However, surgery may not be possible in a large number of patients because of their medical condition or age. Therefore, these patients can be treated with radiosurgery using CyberKnife®.

The patient underwent CyberKnife® radiosurgery, with 27.5 Gy in five fractions delivered in 1 week.

Follow-up MRI performed after 8 months showed stable disease with reduction in vascularity of the tumour. The patient is currently on regular follow-up. No neurological complications or convulsions have been reported or observed during these 8 months.

'Very gratifying that in 8 months post-CyberKnife® treatment, this boy has not reported even a single episode of seizure'

Dr. Sanjay Chandrasekhar



Large mass in hypothalamus with moderate hydrocephalus

'I am happy with this treatment.  
It is painless and more  
comfortable, as compared to the  
radiation treatment I had earlier.'



# Case Study 3

## Breast Carcinoma with Lung Metastasis

### CASE HISTORY

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A 44-year-old female diagnosed with carcinoma of the left breast in the year 2004 and was treated with mastectomy, chemotherapy and radiation therapy was brought to Apollo Speciality Cancer Hospital. The patient was on hormonal therapy.

In the year 2006, the patient developed carcinoma of the contralateral breast (left) and had undergone surgery, followed by chemotherapy and radiation therapy to the left chest wall.

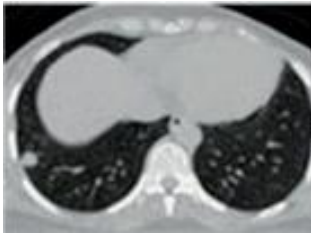
A PET scan was done in 2009. The scan revealed solitary metastasis in the lower lobe of the right lung. Owing to this, the patient was planned for [CyberKnife® treatment](#). The patient was treated with 45Gy radiation dosage in three fractions to the lung lesion and had tolerated the treatment well. Complete response was seen in 3-month post-CyberKnife® follow-up scan.

### DISCUSSION

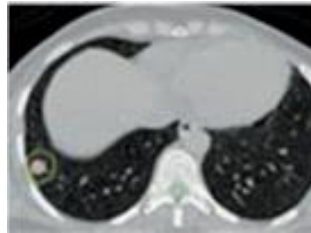
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Radiation therapy or surgery is frequently advised especially if chemotherapy is less efficient for patients suffering from single-lung metastasis. However, as the lung mass moves with respiration, it is difficult to perform radiation therapy. Only respiratory-gated radiation therapy techniques deliver appropriate dose to the target and spare normal lung tissue. CyberKnife® has one of the most efficient respiratory tracking mechanisms (Synchrony) and this technology makes 'real-time' tracking possible by providing correct radiation dose to the tumour and avoiding the normal tissue in the vicinity. In addition, 'See and Shoot' technology in CyberKnife® helps to verify the target position prior to each treatment delivery and is the most accurate 'online' gated radiation therapy technique.

'CyberKnife® is a fantastic option of providing the radiation therapy to the tumours which are mobile, like the one in this case. It avoids radiation exposure to normal tissue to a great extent.'



Pre-CyberKnife®



Dose Distribution



Post-CyberKnife®

'I thought the treatment would be difficult, but the doctors at Apollo reassured me and they were true.

The treatment was absolutely painless and I could go home immediately after the treatment.'



# Case Study 4

## Rectal Carcinoma with Lung Metastasis

### CASE HISTORY

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A 77-year-old male was presented to Apollo Speciality Cancer Hospital reporting rectal carcinoma that was diagnosed in the year 2006. The patient has then undergone surgery (anterio perineal resection), radiation therapy and chemotherapy. The patient was clinically stable until the year 2009. In the year 2009, he developed repeated episodes of cough and pain on the right side of the chest. Owing to these complaints, the patient was evaluated by performing whole body PET scan. The scan revealed increased metabolic activity in lower lobe of the right lung and posterior basal segment pleural base mass. No other site in the body showed activity (disease) in the PET scan. Biopsy from the lung mass was suggestive of metastatic adenocarcinoma.

The patient was diagnosed with solitary lung metastasis with controlled primary site disease and was planned to treat with radical intent using CyberKnife®. He was treated with 45Gy in five fractions in 1 week through CyberKnife® radiosurgery. The patient tolerated the radiosurgery well. A follow-up CT scan was performed at 6-month post-CyberKnife®. The scan revealed a significant reduction in the lung mass.

### DISCUSSION

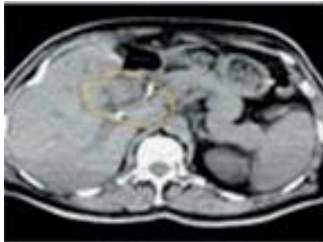
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Hypothalamic neuronal hamartoma, a rare benign condition more common in young adults, is usually present with hormonal imbalance (early puberty) and 'laughing' seizures. Aim of treatment is to control hormonal imbalance and seizures. Hormones are used to control hormonal imbalance while radiation therapy or surgery prevents mass effect and convulsions. As hypothalamus is an important part of the brain, with several vital structures in its vicinity, sub-millimetre accuracy treatment with CyberKnife® radiosurgery is an ideal option for patients with intractable seizures.

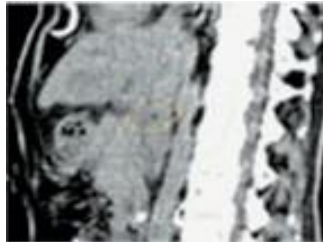
‘CyberKnife was really helpful for the management of this patient, owing to his old age and disease condition.’

Dr. P. Mahadev





Dose Distribution



Post-CyberKnife®

'It was an excellent experience.  
There were no difficulties and I  
could go home immediately after  
the treatment.'



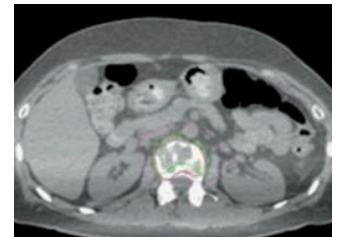
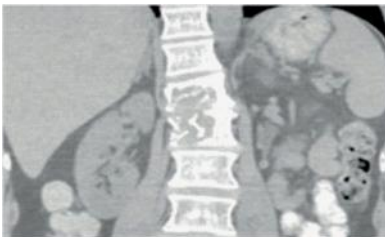
# Case Study 5

## Breast Carcinoma with Spine Metastasis

### HYPOFRACTIONATED RADIATION

A 50-year-old female foreign patient who was diagnosed with a right breast carcinoma 1 year ago reported to Apollo Speciality Cancer Hospital. Earlier, the patient was treated with breast-conserving surgery, chemotherapy and radiation therapy, following the diagnosis. The patient was clinically stable postsurgery for a period of 7 months. However, later she developed pain in the back, which hampered her day-to-day activities.

The patient underwent PET scan and was diagnosed with vertebral bone metastasis in L1-L2 region. She was treated with alternate medicine for relieving the pain. However, the patient did not report any improvement in the pain and was prescribed analgesics (morphine). The patient corresponded with Apollo Speciality Cancer Hospital for CyberKnife® surgery. In Apollo Speciality Cancer Hospital the patient underwent CyberKnife® method with 27Gy radiation dosage in five fractions completed in 1 week. Following the CyberKnife® surgery, the patient reported significant reduction in the pain. Thus, the dosage of the analgesic was reduced.



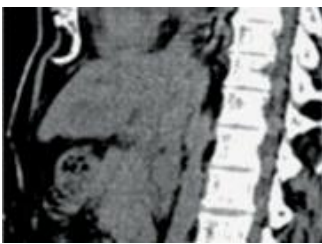
# Case Study 6

## CyberKnife® for Inoperable Cholangiocarcinoma

A 53-year-old male presented with a history of progressive pruritus and jaundice. CT scan of abdomen revealed a 6 \* 5.8 cm infiltrative mass involving segment IV of liver extending to the hepatic confluence and encroaching the hepatic vessels. ERCP stenting with biliary sphincterectomy was done to relieve jaundice, and biopsy confirmed the diagnosis of Cholangiocarcinoma.

PET scan showed the presence of localised but even more extensive disease without any distant metastasis. The lesion was considered inoperable in view of the involvement of hepatic vessels. Therefore, the patient was referred for CyberKnife® treatment.

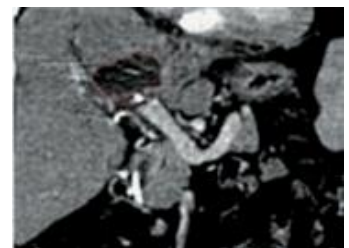
The patient was treated with CyberKnife® with 2250 cGy in five fractions and gold fiducial placement. The patient tolerated the treatment well. A CT scan performed after 6 months of CyberKnife® surgery revealed shrinkage and radiation-induced after changes without any progress of altered liver function suggesting well-being of the patient.



Pre-CyberKnife®



Dose Distribution



Post-CyberKnife®

# Case Study 7

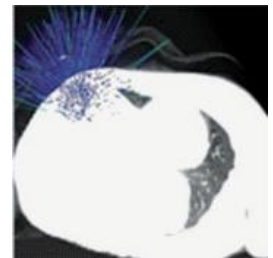
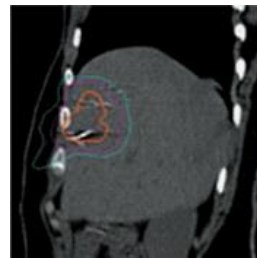
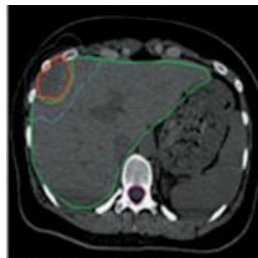
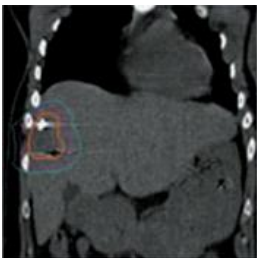
## Breast Carcinoma with Solitary Liver Metastasis

### CASE HISTORY

A 29-year-old female patient reported to Apollo Speciality Cancer Hospital. She was diagnosed with right breast carcinoma in April 2008. Earlier, the patient was treated with breast-conserving surgery, followed by chemotherapy and radiation therapy.

However, during May 2009, the patient was investigated for dyspeptic symptoms and PET scan showed solitary liver metastasis. She was planned for [CyberKnife® treatment](#) and received 30Gy in three fractions at Apollo Speciality Cancer Hospital.

The patient tolerated the CyberKnife® treatment well and there was a significant improvement in her health condition. Follow-up examination performed after 3 months of CyberKnife® showed no obvious symptoms and had complete radiological response.



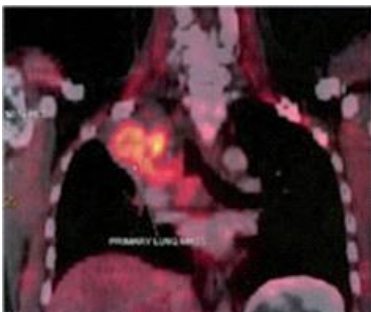
# Case Study 8

## Lung Cancer Treated with CyberKnife®

### CASE HISTORY

A 50-year-old-male patient was presented to Apollo Speciality Cancer Hospital with recurrent episodes of cough for 3 months. The patient was investigated for respiratory symptoms, and CT scan showed a mass in right upper lobe region with mediastinal nodal enlargement. PET scan showed increased uptake, and there was no sign of distant metastasis. CT-guided biopsy from lung mass confirmed primary lung malignancy.

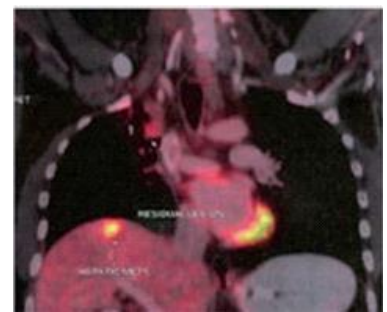
The patient was diagnosed with lung cancer and was planned for CyberKnife® treatment. He received CyberKnife® treatment with 30Gy in three fractions. Follow-up after 3 months of CyberKnife® PET scan showed good radiological response and the patient was doing well.



Pre-CyberKnife®



Dose Distribution



Post-CyberKnife®

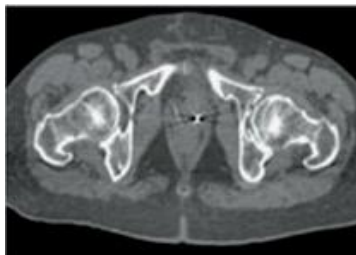
# Case Study 9

## CyberKnife® in Prostate cancer

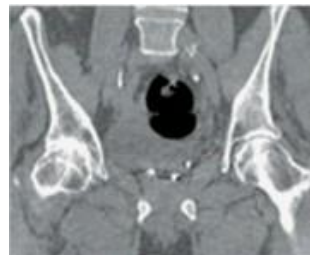
### CASE HISTORY

An 81-year-old male was presented to [Apollo Speciality Cancer Hospital](#) with symptoms of prostatism (urgency and hesitancy in urination). The patient's serum PSA was 6.25 ng/dL. CT scan of prostate showed a nodule in the right lobe of the prostate without capsular breach and no pelvic nodal enlargement. Transrectal biopsy from the prostate confirmed the malignancy (adenocarcinoma, Gleason score 7 [4+3]). Metastatic work up was negative.

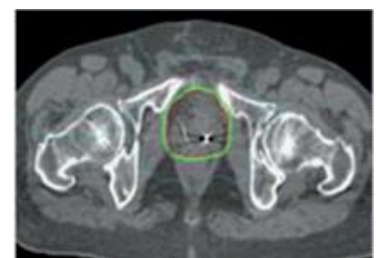
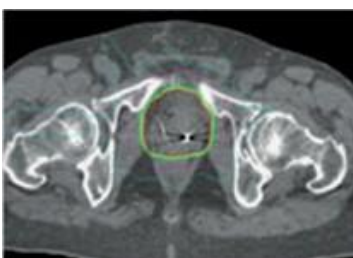
The patient was diagnosed with localised prostate cancer and was planned for CyberKnife® treatment. He received 36.25Gy in five fractions over 1 week with CyberKnife®. The patient completed the treatment without any severe acute toxicity and was not treated with hormonal medicines. Follow-up after 3 months of CyberKnife® showed 3.1 ng/dL PSA, and there was complete radiological response to the prostate nodule.



Pre-CyberKnife®



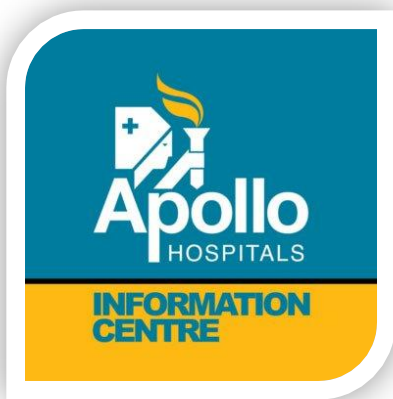
Dose Distribution



Post-CyberKnife®



Contact Us



**Apollo Hospital Information Centre, Nairobi**

**Website: [www.apolloinformationcentre.com](http://www.apolloinformationcentre.com)**

**Address: Suite 4C, TRV Centre on 3rd Parklands Avenue, Nairobi, Kenya - 00623**

**You can also WhatsApp us on +254-719-581035 / +254-789-150890 / +254-748-830976**



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