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CASE REPORT

Lipiodol Embolism with Pneumonitis and ALI after TACE – A Case Report

Devendrappa K R[1], Abdul Qadir[2], Nidhi C[3], Sharique Ahmed[4]

[1]*The Bangalore Hospital Bengaluru, Karnataka 560004*
[2]*Jayanagar General Hospital, Tilak Nagar, Jayanagar, Bengaluru, Karnataka 560041*

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Abstract

Transcatheter arterial chemoembolization (TACE) is a useful palliative therapeutic modality for hepatocellular carcinoma (HCC) and has developed into a successful alternate therapeutic method for people with HCC that is inoperable. TACE is generally secure, however syndrome of acute respiratory distress/Acute Lung Injury with pulmonary lipiodol embolism after TACE was rare and life-threatening, occasionally reported in previous literatures. We report a rare case of lipiodol embolism with pneumonitis/acute lung injury after TACE for HCC.

*Corresponding author: Nidhi C
Email: nidhicgowda@gmail.com

Introduction

The most frequent primary liver cancer, hepatocellular carcinoma (HCC), is one of the leading causes of cancer-related death worldwide, and is frequently diagnosed in a more advanced state. Additionally, HCC frequently coexists with cirrhosis and chronic hepatitis, making curative treatment challenging. The palliative treatment for unresectable HCC is Transcatheter artery chemoembolization (TACE) employing a combination of anticancer drugs and lipiodol. Lipiodol, gelatin sponge (gelfoam), and an anticancer agent are injected into the hepatic artery to cause microvascular embolisation and stagnation of the anticancer medicine, which results in the necrosis of cancer cells. Post-TACE hepatic encephalopathy, ischemic cholecystitis, rupture of HCC, hepatic abscess, severe hepatic failure, and possibly pulmonary metastasis with HCC were complications. They also included pulmonary oil embolism, interstitial pneumonitis, chemical pneumonitis, ALI, ARDS, lipoid pneumonia, acute eosinophilic and neutrophilic pneumonia, bilious pleurit [1]. Despite the fact that TACE is generally safe, pulmonary lipiodol embolism is an uncommon and potentially lethal consequence that doctors frequently do not expect [2].

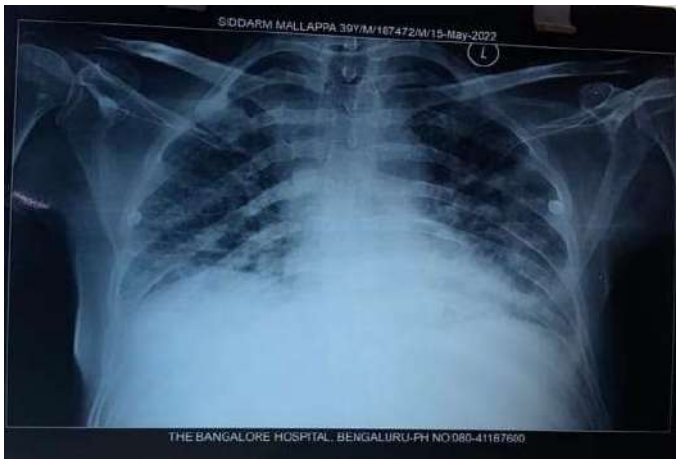
Case Report

A 39 yr old male, Mr.Siddaramu Soddi, resident of Gulbarga, Karnataka state, India, agriculturist by profession was diagnosed to have Hepatocellular Ca in April 2022 and was advised to undergo TACE .

Day 1 - He was admitted to hospital on 13/05/2022 under interventional radiologist for TACE in ward. After basic investigations (which were in normal range except for LFT) and adequate fasting, patient underwent TACE the next day.

He was shifted to ICU post procedure with c/o pain abdomen and at femoral vein access site in an agitated and irritable state. He was hemodynamically stable with BP 130/80 mmhg, HR 103 bpm, RBS 112 mg% and SpO2 of 96-97% at room air. Patient was re-assured. He was given low dose of IV Fentanyl (50 mcg) and IV Hyoscine after which pain subsided and patient was calm in 3-4 hours.

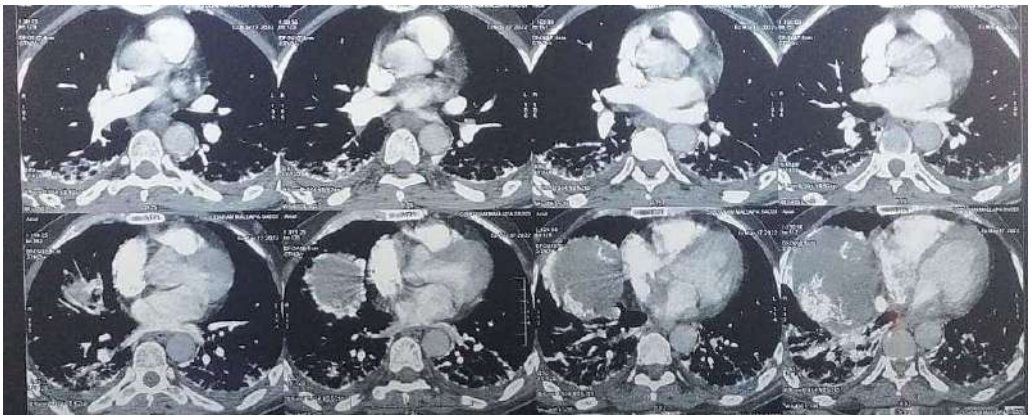
Day 2 – early in the morning spo2 drops to 92% on room air. By afternoon his spo2 further dropped to 88% at room air. His HR increased to 100-110 bpm and BP was stable.2l /min of o2 supplementation was given via nasal canula and spo2 was 94% with oxygen. Clinical examination revealed bronchial breath sounds in bilateral basal lung fields. ABG showed type 1 respiratory failure with Po2 of 60%, cBC showed platelets of 1.17 lacs / cc, LFT was similar to baseline, serum creatinine was normal and procalcitonin was elevated. ECG and 2D ECHO was normal. CXR showed patchy areas of consolidations in bilateral lower lobes with pleural effusion. Pao2: FiO2 ratio being approximately 214.

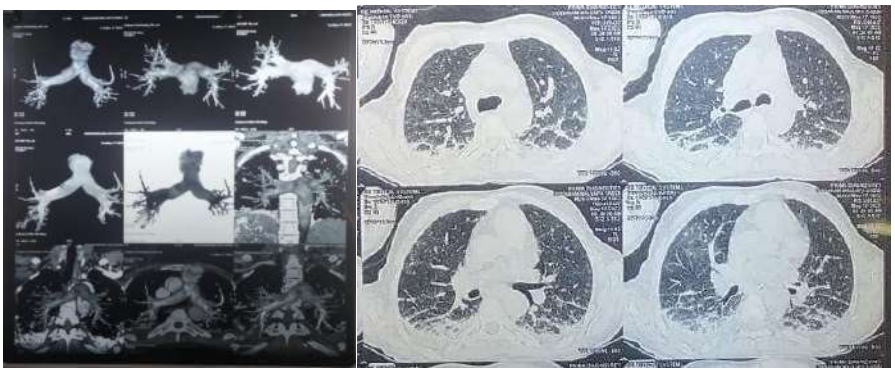


INJ Cefotaxim 1 g iv q12h and Salbutamol with Ipratropium bromide nebulisations every 6th hourly was started.

Day 3 – In view of persistent hypoxia and tachycardia patient underwent CTPA to rule out pulmonary embolism. CTPA showed lipiodal deposition in subsegmental arterial branches of lower lobes and posterior subsegmental branches of upper lobe and confluent parenchymal consolidation with collapse of bilateral lower lobes.

Meanwhile, sputum for AFB was negative and culture had moderate growth of Klebsiella which was sensitive to Meropenem which was started as 1g IV q8h and cefotaxim was stopped.

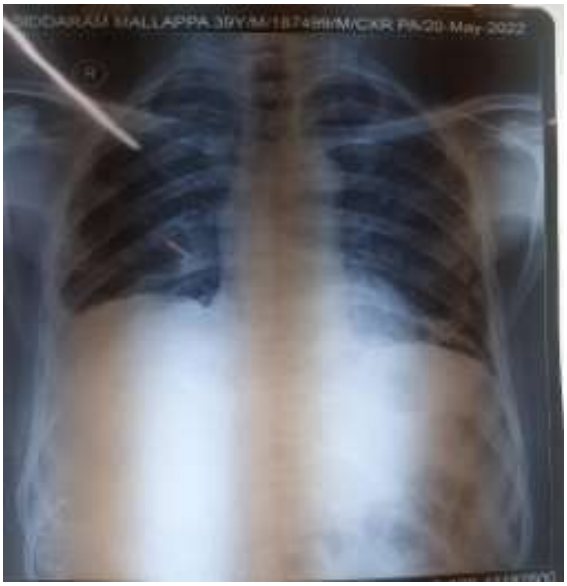




Patient c/o bleeding PR. Repeated CBC showed thrombocytopenia with platelet of 93000/cc. D DIMER was 2350 ng/ml.PT/INR was normal. General surgeon's opinion was taken and managed conservatively.

Inj. Methylprednisolone 40mg IV q6h was started in view of chemical pneumonitis caused by lipiodal deposition. Anti coagulation was not instituted due to thrombocytopenia.Incentive spirometry was started. Awake prone ventilation for 2 hrs, 8hrs apart in a day was started. Oxygen requirements came down to 1l/min with saturations 93-94 %. He was shifted to ward with stable hemodynamics.

Day 4 – Oxygen was stopped. Patient maintained SpO2 94% at room air. Platelets increased to 1.34 lacs/cc, repeat D-Dimer was still elevated 2690ng/ml. CXR repeated showed mild right pleural effusion.



Day 5 – Patient maintained saturation at room air. ABG showed Type 1 respiratory failure with Po2 of 59 mmhg. Antibiotics, steroids, nebulisation along with incentive spirometry, physiotherapy was continued.

Day 6 – patient maintained SpO2 94% at room air. He was subjected for a 6 minutes walk test.He walked > 450 m without any drop in SpO2.

Day 7 – patient was discharged with following treatment and advice.

Tab Predmet 16mg 1-0-1 for 1 day F/B 8mg 1-0-1 for 5 days f/b 8mg 1-0-0 for 5 days.

TabEsmoprazole 20 mg 1-0-0 for 10 days.

Foracort MDI 200mcg 2-0-2 with spacer.

AWAKE PRONING FOR 2 HRS IN A DAY

INCENTIVE SPIROMETRY Q12 H

Follow up visit patient was completely asymptomatic and clinical examination showed no clinical abnormality and adequate functional capacity.

Discussion

In the 1980s, TACE was created using lipiodol and anti-cancer medications using the property of selective accumulation in liver cancer tissue. It works by blocking blood flow, ischemic necrosis of the tumour, maintaining a high concentration of the anti-cancer medication in the tumour for a long time, and suppressing the extracellular efflux of the medication, reducing side effects.

When compared to thrombotic pulmonary embolism, lipiodol pulmonary embolism has a different pathogenesis. The breakdown of oil microemboli is most likely what causes symptomatic pulmonary damage, which may result in pulmonary capillary leakage and non-cardiogenic pulmonary edoema [3,4,5] caused by the harmful unbound free fatty acids that are produced when lipases break down lipiodol enzymatically. respiratory disease risk factors Liver tumours greater than 10 cm are among the lipiodol embolisms, high vascularity of tumour, presence of AV shunting and large Lipiodol volume of more than 20 mL [8]. Lipiodol dosage showed to be the main risk factor for the emergence of pulmonary oil embolism, according to multivariate logistic regression analysis [12]. While the maximum safe dose of Lipiodol was suggested by Chung et al. [6] being between 15 and 20 mL, or roughly 0.25 mL/kg of total body weight, Wu et al. [9] reported that pulmonary oil embolism formation was more likely to occur at dosages above 14.5 mL [10].

Conventional Lipiodol- Based TACE and DEB-TACE both use chemotherapeutic drugs to produce the best therapeutic outcomes in HCC, with doxorubicin being the most often utilised one. Adriamycin along with Lipiodol is also used in many centres.

Doxorubicin is a chemotherapeutic antibiotic anthracycline that blocks DNA topoisomerase II. Systemic doxorubicin seldom has a deleterious effect on the lungs, which is typically associated with cardiotoxicity [12]. Doxorubicin has also been linked to bronchiolitis obliterans organising pneumonia and the capillary leak syndrome in an adult patient [13]. A less harmful version of doxorubicin is pegylated-liposomal doxorubicin (DoxilTM).

Even Doxil^{TM}, though, briefly brought in mild dyspnea. based on data from in vitro, According to Skubitz and Skubitz [14], Doxil^{TM}-induced dyspnea was caused by neutrophils temporarily adhering to the pulmonary circulation and reducing pulmonary compliance. When administered jointly in HCC patients, lipiodol and doxorubicin have the potential to synergistically worsen lung damage than they would either drug alone.

In this instance, a 4F catheter was inserted into the right hepatic artery and a mixture of 15 ml LIPIODOL and 45 ml Doxorubicin was administered into the tumor's feeding channels.

There are numerous things that could be the root of lipiodol pneumonitis. In lymphangiography, lipiodol, an ethyl ester of fatty acids from poppyseed oil, is employed as a contrast agent. An anticancer agent is combined with lipiodol to create an emulsion, which is then injected into an artery to release the anticancer agent over time. Due to the absence of Kupffer cells in tumour tissue, the syphon effect from the tumor's hypervascularity, and the lipiodol's high mucoid characteristics, the lipiodol injection into the hepatic artery selectively distributes in the tumour. It stays in blood

vessels for a long time, anything between a few weeks and a year [10]. These characteristics of lipiodol could have a role in the onset of lipiodol pneumonitis.

There is a report arguing that a bioreaction involving an allergic reaction and radioactively-induced lesions is what causes pneumonitis brought on by lipiodol containing radioactive iodine [11]. The presence of CD 8+ T-cells in BAL fluid, the prevalence of alveolar fibrosis or endothelial damage in interstitial pneumonia, and the clinical and imaging characteristics of radiation pneumonitis all lend credence to this conclusion. However, it has been noted that this method takes several days to weeks to result in pneumonitis, making it appear improbable that this was the patient's actual cause.

All patients received oxygen, anticoagulation, anti-infection, high-dose corticosteroids, and supportive care as part of the treatment and result. In cases of ARDS, assisted mechanical ventilator support therapy was administered [15]. These treatment strategies lacked specificity and lacked distinction from those previously reported [4-7].

In our case we used awake prone ventilation and Incentive Spirometry as one of the strategies which had good effect on ventilation as measured by pulse oximetry and 6 minute walk test along with other treatment mentioned in earlier reports. The anatomical distribution of the pneumonitis on CT which has similarities to early ARDS was the basis of instituting awake proning. Further studies and case reports are needed in utilizing and forming a guideline with regard to utility of awake proning in such cases.

Conclusion

Pulmonary lipiodol embolism and associated pneumonitis is recognized complication of TACE. Respiratory disease risk factors Liver tumours greater than 10 cm are among the lipiodol embolisms, high vascularity of tumour, presence of AV shunting and large Lipiodol volume. Complications can be reduced by limiting the above risk factors. The treatment strategies used in our case can also give an insight into optimal management and assessment of the response to treatment.

Ethics declarations

Funding This study did not receive any funding.

Conflict of interest

The authors declare that they have no competing interests.

Ethics approval, Consent to participate, Consent to publish, Availability of data and material, Code availability

Not applicable.

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