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CASE REPORT

Prognosis of Paraplegia After Receiving Transarterial Chemoembolization for Recurrent Hepatocellular Carcinoma: A Case Report

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Abstract

Transarterial chemoembolization (TACE) is the standard treatment for patients with Barcelona clinic liver cancer staging system stage B hepatocellular carcinoma. However, various TACE complications have been reported, and spinal infarction is one of the rarest. To date, only six specific case reports written in English have been published. We report a rare case of TACE-related spinal cord infarction and compare this case with cases in other reports and literature reviews. The patient experienced a sudden onset of paraplegia, sensory impairment below the T8 dermatome and had difficulty voiding immediately after TACE. The T2WI and DWI found hyperintensity 3.5 h after the onset of symptoms. The patient received high-dose cerebrolysin, hyperbaric oxygen therapy, and traditional rehabilitation. However, 10 months after TACE, motor symptoms were not alleviated. Meanwhile, sensory symptoms were gradually alleviated. The impact of this rare complication to personal life, family, and social participation is overwhelming. Therefore, we should direct our attention to this rare complication and its prognosis.

Keywords: Transarterial chemoembolization complication, Spinal cord injury, Spinal cord infarction prognosis, MRI of acute spinal cord infarction

1. Introduction

Global statistics indicate that primary liver cancer is the sixth most commonly diagnosed cancer and the third leading cause of cancer-related death in 2020.¹ Spinal infarction is one of the rarest complications in transarterial chemoembolization (TACE), which is the standard treatment for Barcelona clinic liver cancer staging system (BCLC) stage B.²

Most journals and textbooks only describe the prognoses of traumatic spinal cord

injuries, whereas only few focus on other etiologies. Thus, medical care professionals have no consensus in the prognosis of other etiologies. Our aim is to present an uncommon spinal cord infarction case and its result on the 10th month.

2. Case report

A 59-year-old man with BCLC stage B was admitted for his eighth TACE. He had a history of hepatitis B virus carrier and cirrhosis, received partial liver resection, seven times of previous TACE, three times of radiofrequency ablation therapy (RFA), and percutaneous

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ethanol injection (PEI) in the past 6 years. No apparent neurologic symptoms were determined prior to this admission.

As the patient had undertaken TACE multiple times, artery selection was limited. He was offered the choice of liver transplantation but refused. His right 10th intercostal artery and left hepatic artery were selected at this time. Adriamycin, antibiotics, lipiodol, and gelfoam cubes were used during the procedure. He complained about sudden paraplegia and sensory impairment below the T8 dermatome and urinary and stool retention right after receiving TACE. Three Tesla non-contrast spinal MRI were performed 3.5 h after his initial complaint. From the T11 to L1 level, the signal increased in the T2WI and DWI, and the signal decreased in the ADC. The signal increased in the axial T2WI below the T11 level in the anterior spinal cord region (Figs. 1 and 2). The clinical assessment was American Spinal Injury Association (ASIA) impairment scale A with a neurologic level in T8. A lower thoracic anterior spinal cord infarction was highly suspected.

The patient received high-dose cerebrolysin, hyperbaric oxygen therapy (HBOT), and rehabilitation. After 2 months, his ASIA impairment scale improved from A to C. The key muscles of his lower extremity were all graded 0, but his voluntary anal contraction recovered. After a new recurrence of focal hepatocellular carcinoma (HCC) was discovered, RFA was performed. Thereafter, he was transferred to another rehabilitation center.

After 10 months, the ASIA impairment scale of the patient remained C. The key

muscle power of all the lower extremities remained grade 0, except bilateral L3, which had a grade of 1. The grades of most of the bilateral sensory key points below T8 changed from 0 to 1, and his proprioception and vibration recovered. However, he was admitted for a large sacral grade 4 pressure sore. Bilateral liver multiple recurrent HCC nodules, massive ascites, Child-Pugh C, ECOG 3–4, and extrahepatic metastasis were discovered. He was discharged after his wound condition improved.

3. Discussion

TACE complications can be categorized into vascular and nonvascular types,³ and the vascular type can be further divided into recent and distant nontarget embolization. The incidence of nontarget organ embolization is approximately 4.6%.⁴ Spinal cord infarction is a rare condition with an incidence of approximately 0.3%.^{5,6}

The distinguishable features of spinal cord infarction include sudden onset, symptoms reaching a plateau within hours, back pain, and flaccidity.⁷ To date, only six specific cases of TACE-related spinal cord infarction have been reported in English^{8–13} (Table 1). Here, we summarized these cases along with our case. Several similarities were observed, including middle-aged male patients, multiple times of TACE, intercostal arteries as targets, use of lipiodol instead of HepaSphere, and the presence of hyperacute clinical symptoms. According to the death statistics of 2020 reported by the



Fig. 1. (A) Lower thoracic cord expansion. (B) Signal increase in DWI at the T11–L1 level.

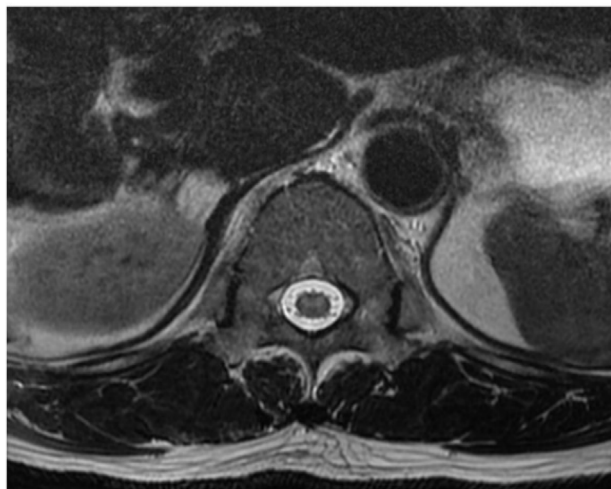


Fig. 2. Non-contrast T spine MRI in the T11 axial section revealing an increasing signal for the anterior spinal cord.

Taiwan Ministry of Health and Welfare, most patients with liver cancer were males, and cancer-related deaths occurred in patients aged 70 or older. The majority of the

case reports used lipiodol instead of HepaSphere possibly because HepaSphere is a relatively novel invention. However, lipiodol is liquid in nature and is thus more

Table 1. Cases reports of TACE-related spinal cord infarction in hepatocellular carcinoma patients.

Case reports	Sex	Age (yr.)	TACE times	Selected artery	MRI times	MRI findings	Prognosis
Park et al. [8]	M	57	Several times	Right post. intercostal a.	6 hours	Normal finding	Motor and proprioception total recovery after 45 days
Bazine et al. [9]	F	62	1	Proper hepatic a.	24 hours	T2 hyperintensit y	No motor recovery Total sensory recovery
Tufail et al. [10]	M	45	2	Right hepatic artery, inferior phrenic a.	No records	Normal finding	Both motor and sensory total recovery
Kim et al. [11]	M	65	19	Right 11th and 12th intercostal a.	No records	T2 hyperintensit y	Only partial motor recovery and total sensory recovery after 2 months
	M	55	6	Left 8th and 9th intercostal a.	No records	T2 hyperintensit y	Both motor and sensory total recovery after 2 months
12. Lin GH, Shih YL. [12]	M	74	3	Right hepatic artery, 10th and 11th intercostal a.	5 hours	DWI hyperintensit y	No apparent improvements after 100 days
Zhang J et al. [13]	M	68	7	Right internal mammary a.	No records	T2 hyperintensit y and no gadolinium enhancement	Motor improved to functional walking after 1 month
Our case	M	59	8	Left hepatic a., right 10th intercostal a.	3.5 hours	T2 and DWI hyperintensit y	No apparent motor recovery and gradual sensory recovery after 10 months

M: Male; F: Female; a: artery

likely to have distal embolization. Two cases with initial normal MRI entailed nearly total recovery. However, prognosis varied among patients with positive initial MRI findings. Two cases with hypertension and diabetes entailed outcomes worse than those of the other cases. Despite the lack of treatment guidelines, all cases used high-dose steroids. In the poor prognosis cases, most of the sensory symptoms improved, but the motor function remained poor. The anterior spinal cord is prone to ischemic damage because of anatomy. The findings are insufficient to make a conclusion.

In our case, the reasonable cause can be attributed to the small fragments of the embolization agent flowing back from the 10th intercostal artery to the artery of Adamkiewicz and finally to the anterior spinal artery. Moreover, the chemotherapy agent may cause vasospasm. The ASIA impairment scale neurologic injury level was at the T8 level in our case. However, the initial MRI revealed a hyperintensity below the T11 level. The inconsistency between clinical symptoms and MRI findings can be attributed to either the limitation of early MRI examination or different impacts on the spinal cord at that time. Three hours was the earliest time when spinal cord infarction showed a positive finding in the DWI in a previous study.¹⁴ A typical spinal cord infarction image in the acute phase included slight cord expansion on T1WI and hyperintensity in T2WI and DWI.¹⁵ The best image protocol reported was MRI with contrast and diffusion. T2WI (sagittal and axial) combined with DWI were also recommended.¹⁵ The lack of a direct visualization of the anterior spinal artery indicates that the early use of computed tomography angiography and magnetic resonance angiography does not facilitate diagnosis, but they can aid in ruling out other etiologies.¹⁵ MRI with contrast can facilitate differential diagnosis in the acute stage in the presence of an infection, and inflammation, or when a tumor reveals gadolinium enhancement, except in infarction.¹⁶ High Tesla MRI has high image quality, but it increases artifacts.¹⁶

Most journals and textbooks only describe the prognosis of traumatic spinal cord injury because it is the most common etiology. According to previous statistics, the

admission rate for spinal cord infarction is approximately 1%–8% in Europe and America.¹⁷ Nearly 20% of all non-trauma-related spinal cord injury are ischemic injuries.⁹ Only few studies have attempted to compare the prognoses of traumatic and ischemic injuries. Scivoletto et al.¹⁷ included 214 ischemic patients from 25 different centers, examining the largest patient sample to date. The study concluded that the prognosis factors were dependent on age, comorbidity, injury level, and whether an injury is complete or incomplete injury instead of etiologies. Scivoletto et al.,¹⁷ Iseli et al.,¹⁸ Scivoletto et al.,¹⁹ McKinle et al.,²⁰ and Pouw et al.²¹ did not find any differences in neurologic and functional status outcomes between traumatic and ischemic groups. However, Bonavita et al.²² determined that the trauma group led by 11 points over the ischemic group in Spinal Cord Independence Measure III.

These aforementioned articles only compared the prognoses of traumatic and ischemic types of spinal cord injury. Their conclusions may not be suitable to other etiologies. Furthermore, these studies did not mention whether patients had TACE-related spinal cord infarction, and the pathophysiology between atherosclerotic plaques and TACE-related spinal cord infarction varied, which included contrast medium, chemotherapy drugs, lipiodol, HepaSphere, and artificial embolization agents. Most studies concluded that the ischemic type have the same prognosis as the traumatic type. Future studies are needed to ensure whether this conclusion can be attributed to the TACE-related type.

4. Conclusion

Among the TACE complications, spinal infarction is one of the rarest. Most of the sensory symptoms were alleviated, but the motor function remained poor. Few journals and textbooks have elucidated the prognosis of spinal cord infarction. We aim to draw public attention to the prognosis of TACE related spinal cord infarction.

Conflict of interest

The authors declare that there is no conflict of interest.

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