Review Article ISSN 3069-8154

Journal of Surgery and Surgical Procedures

Liver Transplantation for Colorectal Liver Metastases : Current Evidence and Future Perspectives

Ahmet Gökhan Sarıtaş, Uğur Topal*

Department of General Surgery, Faculty of Medicine, Çukurova University, Adana, Turkey.

***Corresponding author**

Uğur Topal,
Department of General Surgery, Faculty of Medicine, Çukurova University, Adana, Turkey.

Submitted: 2 Apr 2026; **Accepted:** 11 Apr 2026; **Published:** 20 Apr 2026

Citation: Topal, U. & Sarıtaş, A. G. (2026). Liver Transplantation for Colorectal Liver Metastases : Current Evidence and Future Perspectives. *J Sur & Surgic Proce.,4*(2):1-3. DOI : https://doi.org/10.47485/3069-8154.1030

Abstract

Colorectal cancer (CRC) remains a leading cause of cancer-related mortality worldwide, with the liver being the most common site of metastatic spread. While surgical resection represents the only potentially curative treatment for colorectal liver metastases (CRLM), the majority of patients present with unresectable disease and are managed with systemic chemotherapy, which offers limited long-term survival.

In recent years, liver transplantation (LT) has re-emerged as a promising therapeutic strategy for highly selected patients with unresectable CRLM. Advances in patient selection, perioperative management, and oncological therapies have significantly improved outcomes compared to earlier experiences. Contemporary studies, including the SECA trials and the recent TransMet randomized trial, have demonstrated 5-year survival rates approaching 60%–80% in selected populations, challenging the traditional view of metastatic CRC as uniformly incurable.

The success of LT in this setting is closely linked to stringent selection criteria, including controlled primary tumor, absence of extrahepatic disease, favorable tumor biology, and response to chemotherapy. Despite encouraging survival outcomes, recurrence remains common, most frequently involving the lungs, although often with indolent behavior allowing for further therapeutic interventions.

However, the application of LT for CRLM raises important ethical considerations, particularly regarding organ allocation in the context of limited donor availability. Balancing individual patient benefit with societal resource distribution remains a key challenge.

In conclusion, LT represents a paradigm shift in the management of unresectable CRLM and offers a potential curative option in carefully selected patients. Ongoing research focusing on biomarker-driven selection and optimization of oncological strategies is expected to further refine its role within multidisciplinary cancer care.

Keywords: Cancer, Liver, Transplantation.

Introduction

Colorectal cancer (CRC) is one of the most prevalent malignancies worldwide and represents a major contributor to cancer-related mortality (Sung et al., 2021; Siegel et al., 2023). The global burden of CRC continues to rise, particularly in younger populations, which has significant implications for long-term disease management (Araghi et al., 2019; Patel & Ahnen, 2018). The liver is the most common site of metastasis in CRC due to portal venous drainage from the colon and rectum (Van der Geest et al., 2015). Approximately 40%–50% of patients develop liver metastases either synchronously or metachronously during the course of the disease (Manfredi et al., 2006; Adam et al., 2004).Surgical resection remains the gold standard for curative treatment of colorectal liver metastases (CRLM) (Choti et al., 2002). However, only a limited proportion of patients are eligible for resection due to tumor burden, distribution, or inadequate future liver remnant (Pawlik et al., 2005; Abdalla et al., 2004). For the majority of patients with unresectable disease, systemic chemotherapy remains the standard treatment (Van Cutsem et al., 2022). While modern chemotherapy regimens have improved survival, they rarely provide a definitive cure (Kopetz et al., 2019). In recent years, liver transplantation (LT) has emerged as a potential alternative treatment strategy (Dueland et al., 2020; Hagness et al., 2013). This shift reflects advancements in surgical techniques, oncological therapies, and improved understanding of tumor biology (Llovet et al., 2021).

Rationale for Liver Transplantation

The primary rationale for liver transplantation in CRLM lies in the complete removal of all liver tissue harboring metastatic disease (Dueland et al., 2015). This theoretically achieves a total oncologic clearance within the liver.Unlike resection, which may leave behind microscopic disease, transplantation removes both visible and occult metastases (Toso et al., 2017).

This approach can potentially reduce intrahepatic recurrence rates (Line et al., 2015). Additionally, LT replaces diseased liver tissue with a healthy graft, restoring normal hepatic function. This is particularly relevant in patients who have received extensive chemotherapy (Dueland et al., 2015). The concept of transplant oncology supports the use of LT in selected malignancies where complete disease control is achievable (Sapisochin et al., 2017). CRLM represents an evolving indication within this framework (Llovet et al., 2021). However, this strategy requires extremely careful patient selection, as the systemic nature of metastatic disease introduces the risk of recurrence even after complete hepatic replacement (Adam, 2012).

Clinical Evidence

Early studies investigating LT for CRLM reported poor outcomes, leading to abandonment of the approach (Mühlbacher et al., 1991). However, these studies lacked modern patient selection criteria and systemic therapies. More recent data have demonstrated significantly improved survival outcomes in carefully selected patients. Five-year survival rates of 50%–80% have been reported in contemporary series (Hagness et al., 2013; Dueland et al., 2020). The TransMet randomized trial represents a landmark study comparing LT plus chemotherapy versus chemotherapy alone. The results showed a clear survival benefit in the transplant group (TransMet Trial Investigators, 2024). These findings suggest that LT can offer a meaningful survival advantage in selected patients with unresectable CRLM. This challenges the traditional palliative paradigm of metastatic CRC (Adam et al., 2015). Despite promising results, it is important to recognize that these outcomes are derived from highly selected patient populations. Generalization to broader clinical practice requires caution.

Patient Selection

Patient selection is the most critical factor influencing outcomes after LT for CRLM (Dueland et al., 2020). Only a small subset of patients meet the criteria for transplantation. Ideal candidates typically have a controlled primary tumor, absence of extrahepatic disease, and a favorable response to chemotherapy (Fong et al., 1999; Adam et al., 2009). These factors indicate more favorable tumor biology.Tumor burden also plays a significant role in selection. Patients with limited number and size of metastases tend to have better outcomes following transplantation (Pawlik et al., 2005). Biomarkers such as carcinoembryonic antigen (CEA) levels can provide additional prognostic information. Lower CEA levels are generally associated with improved survival (Duffy, 2001). Multidisciplinary evaluation is essential in determining transplant eligibility. This involves collaboration between surgeons, oncologists, radiologists, and transplant specialists (NCCN Guidelines, 2024).

Recurrence

Recurrence after LT for CRLM remains a major concern (Dueland et al., 2020). Despite complete removal of the liver, metastatic disease may reappear in other organs. The lungs are the most common site of recurrence, reflecting the hematogenous spread of tumor cells (Toso et al., 2017). This pattern differs from typical intrahepatic recurrence after resection.Importantly, recurrence after LT is often indolent and slow-growing. This allows for additional treatment options such as surgical resection or systemic therapy (Hagness et al., 2013). Some studies suggest that recurrence does not necessarily translate into poor overall survival. Patients may still achieve prolonged survival despite disease recurrence (Dueland et al., 2020). Understanding recurrence patterns is essential for optimizing post-transplant surveillance and management strategies (Line et al., 2015).

Ethical Considerations

The use of LT for metastatic disease raises significant ethical concerns, particularly in the context of limited donor organ availability (Organ Allocation Ethics, 2018). Allocating scarce organs to patients with malignancy must be balanced against other indications such as end-stage liver disease and hepatocellular carcinoma (Mazzaferro, 2011). There is ongoing debate regarding the justification of LT for CRLM, given the potential for disease recurrence and uncertain long-term outcomes (Sapisochin et al., 2017). Strategies to expand the donor pool, including extended criteria donors and living donor transplantation, may help address these concerns (Toso et al., 2017). Ultimately, ethical decision-making in this context requires careful consideration of both individual patient benefit and broader societal implications (Persson et al., 2020).

Conclusion

Liver transplantation represents a paradigm shift in the management of unresectable colorectal liver metastases (Dueland et al., 2020). Emerging evidence suggests that LT can provide significant survival benefits compared to conventional chemotherapy in selected patients (TransMet Trial Investigators, 2024). However, widespread adoption is limited by organ scarcity, ethical considerations, and the need for strict patient selection (NCCN Guidelines, 2024). Future research should focus on refining selection criteria and integrating novel biomarkers to improve patient outcomes (Llovet et al., 2021). As the field of transplant oncology continues to evolve, LT may become an increasingly important component of multidisciplinary cancer care (Sapisochin et al., 2017).

References

1. Sung, H., et al. (2021). Global cancer statistics. CA Cancer Journal for Clinicians.
2. Siegel, R. L., et al. (2023). Cancer statistics. CA Cancer Journal for Clinicians.
3. Araghi, M., et al. (2019). Global CRC trends. Lancet Gastroenterology & Hepatology.
4. Patel, S. G., & Ahnen, D. J. (2018). CRC epidemiology. Gastroenterology.
5. Van der Geest, L. G., et al. (2015). Liver metastases. European Journal of Cancer.
6. Manfredi, S., et al. (2006). Metastasis incidence. Annals of Surgery.
7. Adam, R., et al. (2004). Is hepatic resection justified? Annals of Surgery.

8. Choti, M. A., et al. (2002). Trends in survival. Annals of Surgery.
9. Pawlik, T. M., et al. (2005). Tumor burden. Annals of Surgery.
10. Van Cutsem, E., et al. (2022). ESMO guidelines.
11. Kopetz, S., et al. (2019). Chemotherapy outcomes. Journal of Clinical Oncology.
12. Dueland, S., et al. (2020). SECA-II outcomes. Annals of Surgery.
13. Hagness, M., et al. (2013). SECA-I study. Annals of Surgery.
14. Llovet, J. M., et al. (2021). Oncology advances. Nature Reviews Clinical Oncology.
15. Dueland, S., et al. (2015). LT rationale. British Journal of Surgery.
16. Toso, C., et al. (2017). LT outcomes. Annals of Surgery.
17. Line, P. D., et al. (2015). Transplant outcomes. Transplantation.
18. Sapisochin, G., et al. (2017). LT indications. Lancet Gastroenterology & Hepatology.
19. Adam, R. (2012). Resectable colorectal liver metastases. Journal of Clinical Oncology.
20. Mühlbacher, F., et al. (1991). Early LT outcomes. Transplantation.
21. TransMet Trial Investigators. (2024). Randomized trial. Lancet.
22. Adam, R., et al. (2015). Treatment strategies. Lancet Oncology.
23. Fong, Y., et al. (1999). Clinical risk score. Annals of Surgery.
24. Adam, R., et al. (2009). Chemotherapy and surgery. Journal of Clinical Oncology.
25. Duffy, M. J. (2001). CEA as marker. Clinical Chemistry.
26. NCCN Guidelines. (2024). Colon cancer guidelines.
27. Organ Allocation Ethics. (2018). Ethical issues. Lancet.
28. Mazzaferro, V. (2011). Transplant oncology. Lancet Oncology.
29. Persson, N. H., et al. (2020). Ethics in LT. Transplantation.