200 minimalno invazivnih resekcij jeter v UKC Maribor

200 minimally invasive liver resections at the UMC Maribor

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IZVLEČEK

Prve laparoskopske resekcije jeter (LRJ) so naredili na začetku devetdesetih let prejšnjega stoletja, to so bile manjše robne resekcije jeter. Od takrat je število LRJ eksponentno poraslo in posegi so postali bolj kompleksni, zato se je pojavila potreba po regulacijah in smernicah. Prva LRJ na Kliničnem oddelku za abdominalno in splošno kirurgijo UKC Maribor je bila opravljena aprila 2008. Od takrat je število opravljenih resekcij z vsakim letom večje, posegi so postajali vedno bolj zahtevni, tako danes LRJ pri nas predstavljajo približno 50 % vseh resekcij jeter. Razvoj kirurške tehnike smo nadgradili z znanstveno raziskovalnim delom. Namen prispevka je predstaviti naše objave v mednarodnih revijah s faktorjem vpliva.

V našem prvem objavljenem članku z naslovom *Laparoskopska anatomska resekcija jeter po kompleksni topi poškodbi jeter: predstavitev kliničnega primera* smo predstavili uspešno laparoskopsko anatomsko resekcijo jeter pri 20-letnem moškem s topo poškodbo jeter po prometni nesreči. To je bila prva takšna objava kliničnega primera na svetu.

ABSTRACT

In the early 1990s, small wedge laparoscopic liver resections (LLRs) were first reported. Since then, the number of LLR has grown exponentially and procedures became more complex; hence the need for regulations and guidelines. The first LLR at the Clinical Department of Abdominal and General Surgery, UMC Maribor was performed in April 2008. Due to increased frequency and complexity, LLRs have represented roughly 50% of all liver resections in the last few years. From the first LLR performed in 2008 until today, 194 LLRs were performed. The development of surgical technique has been upgraded by research activity. Hereinafter we present articles published in international journals with impact factor throughout our journey with LLR.

In the first article entitled *Laparoscopic anatomical liver resection after complex blunt liver trauma: a case report published in 2018* we presented a successful laparoscopic anatomical liver resection in a 20-year-old male with blunt liver trauma following a

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V članku objavljenem leta 2018 z naslovom *Simultana laparoskopska resekcija primarnega kolorektalnega karcinoma in sinhrone jetrne metastaze: uporaba točkovalnega sistema ujemanja rezultatov* smo primerjali izid čiste laparoskopske in odprte simultane resekcije tako primarnega kolorektalnega raka kot sinhronih kolorektalnih metastaz v jetrih. Opazovali smo perioperativne, onkološke in izide preživetja. Med tema skupinama nismo našli statistično pomembnih razlik razen prednosti laparoskopske kirurgije in sicer v krajši hospitalizaciji in hitrejšemu uživanju trde hrane po operaciji. Laparoskopski poseg je primeren za izbrane paciente v terciarnih centrih z zadostnim številom takšnih pacientov in ustreznimi izkušnjami operaterja.

Z razvojem LRJ so mnogi začeli iskati primerne težavnostne točkovne sisteme, ki bi predvideli perioperativne izide minimalno invazivne kirurgije jeter. Tako se je tudi naše zanimanje usmerilo v to smer in leta 2019 smo na to temo objavili članek *Zunanje ovrednotenje točkovalnega sistema težavnosti za oceno tveganja intraoperativnih zapletov pri laparoskopski resekciji jeter.* Naredili smo zunanjo potrditev in nadgradnjo točkovalnega sistema težavnosti za napovedovanje intraoperativnih zapletov med LRJ, ki ga je predlagal Halls s sodelavci. Z zunanjo validacijo smo dokazali, da nam predlagan točkovalni sistem težavnosti na podlagi bolnikovih, tumorskih in kirurških dejavnikov omogoča oceno tveganja za intra- in pooperativne zaplete in je zato uporaben pri predoperativnem načrtovanju.

Leta 2020 smo opravili zunanje vrednotenje drugega točkovnika težavnosti z naslovom *Vrednotenje Iwate modela za napoved težavnosti laparoskopske jetrne resekcije; je velikost tumorja pomembna?* kjer smo zunanje vrednotili model točkovanja Iwate in njegovo prognostično vrednost za napovedovanje tveganja intra- in pooperativnih zapletov pri LRJ. Prav tako smo predlagali nov prag za indeks velikost tumorja in sicer 38 mm, ki je izboljšal kvaliteto napovedi.

V multicentrični študiji objavljeni leta 2020 z naslovom *Primerjava laparoskopske in klasične desne*

car accident. This was first such case report in the world at the time of the publication.

In the article published in 2018 entitled *Simultaneous pure laparoscopic resection of primary colorectal cancer and synchronous liver metastases: a single institution experience with propensity score matching analysis* we compared the outcome of pure laparoscopic and open simultaneous resection of both primary colorectal cancer and synchronous colorectal liver metastases. We observed perioperative, oncologic and survival outcomes and found no significant differences among the two groups, except the advantages of laparoscopic surgery reflected in reduced hospital stay and faster solid food oral intake. Therefore, we concluded that laparoscopic procedure is beneficial for well-selected patients in high-volume centers with appropriate expertise.

As interest started to grow in difficulty scores predicting perioperative outcomes in LLR, we started focusing on this and in 2019 published the article *The external validation of a difficulty scoring system for predicting the risk of intraoperative complications during laparoscopic liver resection.* We externally validated and upgraded a recent difficulty scoring system proposed by Halls et al. to predict intraoperative complications during LLR. This external validation proved that this difficulty scoring system based on patient's, tumor, and surgical factors enables us to estimate the risk of intra- and postoperative complications and is useful in preoperative planning.

We performed an external validation of another difficulty score in 2020 entitled *Evaluation of the Iwate Model for Predicting the Difficulty of Laparoscopic Liver Resection: Does Tumor Size Matter?* We concluded that the Iwate scoring model predicts the probability of complications across difficulty levels and also proposed a new tumor size threshold (38 mm) which improves the quality of the prediction.

In a multi-center study entitled *Laparoscopic versus open right posterior sectionectomy: an international, multicenter, propensity score, matched evaluation*

posteriorne sekcionektomije: mednarodna multicentrična ocena z uporabo točkovalnega sistema ujemanja rezultatov smo primerjali izide laparoskopske in odprte desne posteriorne sekcionektomije. Raziskava je pokazala prednost v korist laparoskopske desne posteriorne sekcionektomije v smislu operativnega časa, izgube krvi in trajanja hospitalizacije brez razlik v večjih zapletih in stopnji resekcije R0.

Z evolucijo LRJ, je naraslo zanimanje za učno krivuljo, zato smo leta 2021 objavili članek z naslovom *Učna krivulja laparoskopske resekcije jeter, ki upošteva točkovni sistem težavnosti* kjer smo kvantitativno ocenili učno krivuljo enega kirurga pri LRJ. Za teoretično napoved intra-operativnega zapleta smo uporabili točkovni sistem težavnosti, ki so ga vpeljali Halls in sodelavci. Po kompleksnem matematičnem modeliranju smo ugotovili, da je naša učna krivulja bolj podobna resničnemu modelu, kjer so prisotna alternirajoča obdobja progresije in regresije dokler se ne doseže ekspertnost, kot pa idealizirani krivulji, kar so poročali v prejšnjih študijah. Predlagani matematični model je mogoče uporabiti za katerikoli kirurški postopek, ki ima točkovni sistem tveganja in znan teoretično napovedan odnos med njim in objektivnim učnim izidom (na primer intra-operativnim zapletom).

Ker LRJ postaja standardiziran poseg, se trudimo nuditi našim pacientom najboljšo oskrbo z najnovejšimi napredki in tehnikami. Ob tem pa z našimi raziskavami prispevamo k nadaljnjemu razvoju in napredku minimalno invazivne kirurgije jeter. LRJ so izvedljive in varne pri skrbno izbranih pacientih v terciarnih centrih s primerno usposobljenostjo.

published in 2020 we participated in the comparison of surgical outcomes between laparoscopic and open right posterior sectionectomy. This international multi-center propensity score-matched study showed an advantage of the laparoscopic right posterior sectionectomy in terms of operative time, blood loss and length of hospital stay without differences in major complications and R0 resection rate.

Along with the evolution of LLR, its learning curves have received increased attention around the world, including ours. For that reason, we published an article in 2021 entitled *The learning curve of laparoscopic liver resection utilizing a difficulty score* aimed to quantitatively evaluate the learning curve of LLR of a single surgeon. The Halls difficulty score for theoretical predictions of intraoperative complications during LLR was applied. Following the complex mathematical modeling, our conclusion was that our learning curve is closer to a true model in which alternating periods of progression and regression occurred until mastery was achieved, rather than the previously reported idealized curve. The proposed mathematical model can be applied to any surgical procedure with an existing difficulty score and a known theoretically predicted association between the difficulty score and given outcome.

As LLR is becoming a standardized procedure worldwide, we strive to provide our patients the best treatment including the most recent advances and techniques while also contributing to further progress and development of LLR with continuous research. Bearing in mind all the above mentioned, it is important to emphasize that LLR is feasible and safe in carefully selected patients at high volume centers with appropriate expertise.