Globalna Analiza Kolecistektomije Iskustva i Ishodi

GECKO

Međunarodna prospektivna kohortna studija o kolecistektomiji

Protokol Studije v1.0

14. svibnja 2023.

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VREMENSKI OKVIR PROJEKTA

DATUMI	OPIS
15. svibanj 2023	Online pokretanje Gecko protokola
1. srpanj 2023	Virtualna konferencija pokretanja **GECKO** studije
00:00 31. srpanj – 23:59 13. kolovoz 2023	Prikupljanje podataka **razdoblje 1** (+ 30-dnevno praćenje: završetak 12. rujan 2023) (+ jednogodišnje praćenje: završetak 13. kolovoz 2024)
00:00 14. kolovoz – 23:59 27. kolovoz 2023	Prikupljanje podataka **razdoblje 2** (+ 30-dnevno praćenje: završetak 26. rujan 2023) (+ jednogodišnje praćenje: završetak 27. kolovoz 2024)
00:00 28. kolovoz – 23:59 10. rujan 2023	Prikupljanje podataka **razdoblje 3** (+ 30-dnevno praćenje: završetak 10. listopad 2023)(+ jednogodišnje praćenje: završetak 10. rujan 2024)
00:00 11. rujan – 23:59 24. rujan 2023	Prikupljanje podataka **razdoblje 4** (+ 30-dnevno praćenje: završetak 24. listopad 2023) (+ jednogodišnje praćenje: završetak 24. rujan 2024)
00:00 25. rujan – 23:59 8. listopad 2023	Prikupljanje podataka **razdoblje 5** (+ 30-dnevno praćenje: završetak 7. studeni 2023) (+ jednogodišnje praćenje: završetak 8. listopad 2024)
00:00 9. listopad – 23:59 22. listopad 2023	Prikupljanje podataka **razdoblje 6** (+ 30-dnevno praćenje: završetak 21. studeni 2023) (+ jednogodišnje praćenje: završetak 22. listopad 2024)
00:00 23. listopad – 23:59 5. studeni 2023	Prikupljanje podataka **razdoblje 7** (+ 30-dnevno praćenje: završetak 5. Prosinac 2023) (+ jednogodišnje praćenje: završetak 5. studeni 2024)
00:00 6. studeni – 23:59 19. studeni 2023	Prikupljanje podataka **razdoblje 8** (+ 30-dnevno praćenje: završetak 19. prosinac 2023) (+ jednogodišnje praćenje: završetak 19. studeni 2024)
3. siječanj – 5. ožujak 2024	Proces provjere valjanosti podataka
6. ožujak 2024	Posljednji dan unosa podataka 30-dnevnog praćenja bolesnika
Sredina 2024	Predstavljanje rezultata kratkoročnih ishoda **GECKO** studije
31. srpanj – 19. studeni 2024	Jednogodišnje razdoblje praćenja podataka
22 prosinac 2024	Zaključavanje REDCap baze podataka, posljednji dan unosa podataka jednogodišnjeg praćenja bolesnika

Rana 2025	Predstavljanje rezultata dugoročnih ishoda **GECKO** studije

UPRAVNI ODBOR

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POZADINSKE INFORMACIJE I OBRAZLOŽENJE

Uvod

Kolecistektomija je jedna od najčešćih kirurških operacija koja se izvodi u svijetu. Kandidati za operacijski zahvat su bolesnici koji se liječe zbog bilijarne patologije, kao što su bilijarne kolike, kolecistitis i pankreatoza žučnih kanala [**1,2**]. U bolesnika za koje se smatra da su sposobni za operaciju, kolecistektomija se može izvesti u tri glavna stanja: (1) hitno stanje pri indeksnom prijemu; (2) elektivni zahvat bez prethodnog prijema u bolnicu; ili (3) odgođen zahvat s jednim ili više prethodnih prijema zbog patologije povezane sa žučnim mjehurom [**3**].

Pojava laparoskopije temeljito je razvila bilijarnu kirurgiju i brzo je postala "zlatni standard" pristupa. Nedavne multicentrične studije [**3,4,5**] razjasnile su kako je teret koji sustavima zdravstvene skrbi nameću laparoskopske kolecistektomije prvenstveno uzrokovan ponovnim prijemima bolesnika i komplikacijama koje proizlaze nakon operacijskog zahvata, a ne perioperativnom mortalitetnom teretu koji se češće viđao u otvorenim operacijama [**6**]. Kao rezultat, nacionalna i inetrnacionalna društva [**7,8**] pomaknula su fokus prema stvaranju kulture sigurnosti oko ovog postupka, s glavnim ciljem poboljšanja zadovoljstva bolesnika i smanjenja bolničkih troškova. Gupta i sur. [**9**] opisali su sigurnu kolecistektomiju kao onu koja je "sigurna i za bolesnika (bez ozljede žučnog kanala/šupljeg organa/vaskularne ozljede) i za kirurga koji operira". Univerzalna uspostava sigurne kolecistektomije složen je proces koji se ne oslanja samo na samu operaciju, već i na razne druge čimbenike kao što su promicanje odgovarajuće obuke, poboljšanje bolničke infrastrukture i poboljšanje perioperativne skrbi za bolesnike.

I dalje postoji manjak dokaza o varijacijama sigurnog pružanja laparoskopske kirurgije za bolesti žučnog mjehura na međunarodnoj razini, uključujući zemlje s niskim i srednjim dohotkom. Kako bismo premostili ovaj jaz u znanju, the **G**lobal **E**valuation of **C**holecystectomy **K**nowledge and **O**utcomes (**GECKO**) studija (GlobalSurg 4) će biti međunarodna suradnja koju će organizirati GlobalSurg mreža [**10**], koja će omogućiti istodobno prikupljanje podataka o kvaliteti kolecistektomija korištenjem mjera koje pokrivaju infrastrukturu, procese skrbi i ishode. Širit će se putem kontakata iz Globalne kirurške jedinice “Nacionalnog Instituta za Istraživanje Zdravlja i Skrbi” (engl. National Institute for Health and Care Research (NIHR)), vodećih općih kirurga hitne pomoći i specijalističkih organizacija.

Ciljevi studije

Primarni cilj ove studije je definirati globalne varijacije u usklađenosti sa standardima revizije prije, unutar i poslije operacije (**stranica 9-10**).

Sekundarni ciljevi ove studije su:

1. Odrediti kvalitetu sigurne provedbe kolecistektomije, uključujući stope: (i) postizanja kritičkog pogleda na sigurnost; (ii) intraoperativno korištenje snimanja (npr. kolangiogram); i (iii) pokretanje različitih postupaka spašavanja (npr. subtotalna kolecistektomija) kada je sigurna kolecistektomija ugrožena.

2. Prociijeniti neželjene događaje nakon kolecistektomije (npr. ozljeda žučnog kanala) i njihovo liječenje.

3. Analizirati stope i ishode zloćudnih novotvorina žučnog mjehura.

4. Prociijeniti globalne razlike u dostupnosti usluga kolecistektomije i obuke među uključenim bolnicama.

5. Procijeniti održivu praksu u laparoskopskoj kolecistektomiji na globalnoj razini.

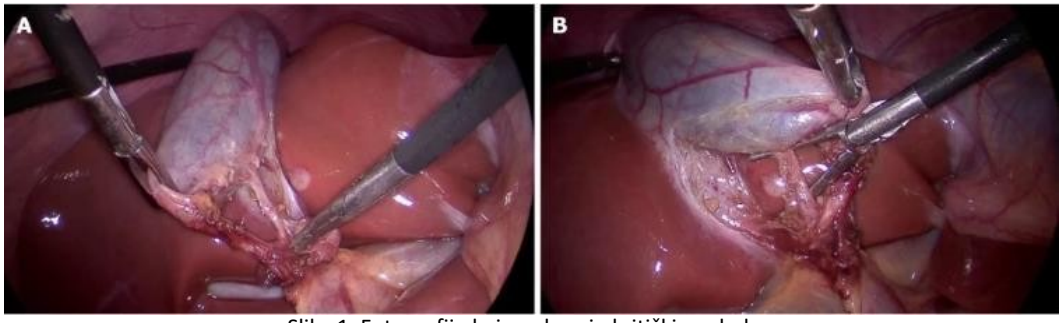
STANDARDI REVIZIJE

Prije-operacijski

1. **Služba intervencijske radiologije:** Treba postojati 24-satni pristup intervencijskoj radiologiji kako bi se podržalo pružanje hitnih HPB usluga [**11**].
2. **Stratifikacija rizika:** Za bolesnike s akutnim kolecistitisom, kirurzi mogu koristiti Tokijske smjernice 18 (TG18) [**8**].
3. **Vrijeme operacije**: U bolesnika s akutnim kolecistitisom, optimalno vrijeme za kolecistektomiju je unutar 48 sati, a ne više od 10 dana od pojave simptoma [**7**].

Intra-operacijski

1. **Kritični sigurnosni prikaz:** upotreba kritičnog sigurnosnog prikaza tijekom laparoskopske kolecistektomije (postizanje sve 3 komponente – slika 1) preporučeni je pristup za ispravnu identifikaciju relevantne anatomije i minimiziranje rizika od ozljeda žučnog kanala [**7,8**]:
   I. **Čišćenje hepatocističnog trokuta:** HC trokut treba očistiti od svog fibro-masnog i mekog areolarnog tkiva.
   II. **Izlaganje donje cistične ploče:** žučni mjehur treba odvojiti od ležišta jetre kako bi se otkrila barem donja trećina cistične ploče.
   III. **Treba vidjeti samo dvije cjevaste structure koje ulaze u žučni mjehur:** cistični kanal i cističnu arteriju.



Slika 1: Fotografije koje pokazuju kritički pogled na sigurnost.

2. **Intraoperativno snimanje:** u bolesnika s nejasnom anatomijom bilijarnog kanala ili sumnjom na ozljedu žučnog kanala, intraoperativno snimanje (npr. kolangiogram, laparoskopski ultrazvuk i kolangiografija bez reza s fluorescencijom) može pomoći u ocrtavanju relevantne anatomije, otkriti kamenje u žučnom kanalu i smanjiti rizik od žuči ozljeda kanala [**7,8,12**].
3. **Postupci spašavanja:** kada se CVS ne može postići i žučna anatomija se ne može jasno definirati drugim metodama (npr. snimanjem) tijekom laparoskopske kolecistektomije, kirurzi bi trebali razmisliti o postupku spašavanja (npr. subtotalna kolecistektomija ili totalna kolecistektomija pristupom fundus-prvo (odozgo prema dolje) pristup) [**7**].

4. **Primjena antibiotika:** Antibiotici nisu potrebni u bolesnika s niskim rizikom koji se podvrgavaju laparoskopskoj kolecistektomiji, ali mogu smanjiti učestalost infekcije rane u bolesnika s visokim rizikom (dob > 60 godina, prisutnost dijabetesa, akutne kolike unutar 30 dana od operacije, žutica, akutni kolecistitis ili kolangitis) [**12**].
5. **Korištenje drenova:** drenovi nisu potrebni nakon elektivne laparoskopske kolecistektomije i njihova uporaba može povećati stope komplikacija; međutim, mogu biti korisni u kompliciranim slučajevima, osobito ako se izvodi koledokotomija [**12**].
6. **Ozljeda žučnog kanala:**
    a. Ako se pojavi velika ozljeda žučnog kanala, ishodi se poboljšavaju ranim prepoznavanjem i neposrednim upućivanjem iskusnim hepatobilijarnim specijalistima na daljnje liječenje prije nego što primarni kirurg pokuša bilo kakav popravak, osim ako primarni kirurg ima značajno iskustvo u rekonstrukciji bilijarnog trakta. [**7,8,12**].
    b. Ako se uzmu u obzir sve vrste ozljeda žučnog kanala, stope su 0,4% i 0,8% za izborne i hitne postupke [**7**].
    c. Preporučljivo je poznavati Strasbergovu klasifikaciju, koja je I dalje najčešće korištena klasifikacija za ozljede žučnog kanala [**7**].

Post-operacijski

1. **30-dnevni ponovni prijem:** stopa bi trebala biti <10% [**11**].
2. **Intenzivna njega:** Treba postojati pristup krevetima za intenzivnu njegu (i razina 2 i razina 3) s bubrežnom nadomjesnom terapijom na licu mjesta [**11**].

PREGLED DIZAJNA STUDIJE

GECKO je prospektivna, međunarodna, multicentrična, opservacijska kohortna studija koju provodi GlobalSurg suradnje. Provodit će se na uzastopnim bolesnicima koji se podvrgavaju kolecistektomiji, između 31. srpnja 2023. i 19. studenog 2023., s praćenjem nakon 30 dana i godinu dana nakon operacije. Mini-timovi do pet suradnika (**stranica 17**) po 14-dnevnom razdoblju prikupljanja podataka, prospektivno će prikupljati podatke u svakom sudjelujućem centru.

GLOBALSURG SURADNJA

GlobalSurg (http://globalsurg.org/) je suradnja između kirurga iz cijelog svijeta koji provode istraživanja u kirurgiji kako bi potaknuli lokalne, nacionalne i međunarodne istraživačke mreže. Korišteni kolaborativni model prethodno je opisan drugdje [**13**] i već je omogućio tri multicentrične međunarodne, prospektivne kohortne studije uključujući ukupno 46.186 pacijenata podvrgnutih hitnoj i elektivnoj abdominalnoj kirurgiji [**14-16**]. "NIHR" jedinica za globalnu kirurgiju osnovana je 2017. i konzorcij je između sveučilišta u Birminghamu, Edinburghu i Warwicku, zajedno s međunarodnim partnerima. Cilj jedinice je unaprijediti obrazovanje studenata medicine i doktora u kirurškoj znanosti, kliničkom istraživanju i metodama revizije promicanjem sudjelovanja u zajedničkim kliničkim istraživanjima i studijama revizije.

POSTAVKE STUDIJE

Studija je otvorena za sve bolnice u svijetu koje izvode hitnu i/ili elektivnu kolecistektomiju. Bolnica koja ispunjava uvjete mora prikupiti uzastopne bolesnike koji su podvrgnuti kolecistektomiji tijekom navedenog razdoblja ispitivanja, nakon odgovarajuće registracije studije u skladu s lokalnim bolničkim propisima.

Uključeni centri trebali bi osigurati da je više od 90% podataka prikupljeno. Centri s >10% podataka koji nedostaju, kada se uključe sve podatkovne točke, bit će isključeni iz konačne analize i uklonjeni iz autorstva. Ne postoji minimalan broj bolesnika po centru, sve dok su uključeni svi prihvatljivi bolesnici liječeni tijekom razdoblja ispitivanja.

STUDIJSKA POPULACIJA

Sažetak

Studijska populacija uključuje uzastopne bolesnike, primljene u bolnicu unutar unaprijed određenih razdoblja prikupljanja podataka, podvrgnute kolecistektomiji kao indeksnoj operaciji.

Kriteriji uključenja

- **Dob**: Svi odrasli bolesnici (stariji od ili uključujući 18 godina).
- **Postupak**: Primarna kolecistektomija, gdje je to glavni planirani zahvat.
- **Pristup**: Otvoreni, laparoskopski (standardni i s jednim otvorom) i robotski. Uključeni su laparoskopski i robotski pristupi bez plina. Laparoskopski i robotski slučajevi s konverzijom također ispunjavaju uvjete.
- **Hitnost**: Elektivni, odgođeni i hitni postupci.

Kriteriji isključenja

- **Postupak:** Bolesnici u kojih je učinjena kolecistektomija u sklopu drugog kirurškog zahvata, na primjer, operacija po Whippleu, barijatrijske, antirefluksne ili transplantacijske operacije treba isključiti.
- **Indikacija**: Bolesnike s Mirizzi sindromom treba isključiti.
- **Povratak u operacijsku salu**: Svaki bolesnik treba biti uključen u studiju samo jednom. Svaki bolesnik koji se vraća u operacijsku salu i kojem je potrebna kolecistekotmija ne bi trebao biti uključen.
- **Poznati zloćudni tumor žučnog mjehura**: Kada se dijagnoza zloćudne novotvorine žučnog mjehura postavi prije operacije, bolesnika treba isključiti. Međutim, ako se zloćudna novotvorina žučnog mjehura neočekivano nađe tijekom ili nakon kolecistektomije (tj. na histološkom pregledu), bolesnika treba uključiti.

STUDIJSKI POSTUPCI

Anketa istraživačkog mjesta

Kako bi se opisali lokalni procesi i resursi, od svakog će se istraživačkog mjesta tražiti da ispuni anketni upitnik na mreži kako bi se opisale varijacije usluga kolecistektomije i obuke među uključenim bolnicama (**Dodatak C**).

*Ispunjavanje kratkog pregleda istraživačkog mjesta može obaviti nadzorni konzultant (poželjno) ili vodeći pripravnik u bolnici koji je upoznat s praksom kolecistektomije na vašem istraživačkom mjestu. Ispunjavanje ankete istraživačkog mjesta potrebno je prije nego što se istraživačkom mjestu odobri pristup **GECKO** mrežnoj stranici: Obrazac za prikupljanje podataka.*

Prikupljanje podataka

Suradnici će prikupljati podatke o uzastopnim prihvatljivim bolesnicima koji su podvrgnuti kolecistektomiji unutar unaprijed određenih razdoblja prikupljanja podataka (**Tablica 1; strana 15**). Lokalni istraživači trebali bi koristiti kombinaciju **GECKO** Obrasca za prijavu slučaja (**Dodatak A**) uz Riječnik podataka (**Dodatak B**) za uspješno bilježenje potrebnih podataka o svim bolesnicima koji ispunjavaju uvjete. Suradnici će stvoriti jasne mehanizme primjerene svojoj ustanovi za identifikaciju i uključivanje svih prihvatljivih bolesnika, uključujući dnevni pregled operativnih dnevnika, sastanak multidisciplinarnog tima, prijemne i primopredajne liste. Lokalni dogovori mogu uključivati dnevni pregled bolesnika i bilješke usmjerene na uključene podatkovne točke.

Podatci će se prikupljati i pohranjivati online putem web aplikacije “Research Electronic Data Capture” (REDCap) (**strana 20-21**), koju vodi Sveučilište u Edinburghu, Ujedinjeno Kraljevstvo. Nikakvi podatci koji bi mogli identificirati bolesnika neće biti učitani ili pohranjeni u bazi podataka REDCap.

Strategije za identifikaciju uzastopnih podobnih bolesnika mogu uključivati:

- *Dnevni pregled popisa elektivnih operacija.*
- *Dnevni pregled lista za primopredaju bolesnika/lista s hitnog prijema i odjelnih listi.*
- *Dnevni pregledi operacijskih listi (i elektivnih i hitnih).*

Razdoblje praćenja

Centri će provoditi praćenje bolesnika u dvije vremenske točke:

1. **30-denvno praćenje:** treba se provesti za sve uključene bolesnike. Svaki će bolesnik biti praćen 30 dana počevši od dana operacije (0. dan).
2. **Jednogodišnje praćenje**: zbog prirode studije, čiji je cilj prociijeniti ozljede žučnog kanala i zloćudne novotvorine žučnjaka na koje se prethodno nije sumnjalo, cilj je prikupiti podatke o jednogodišnjem praćenju svih bolesnika. Svaki će bolesnik biti praćen godinu dana počevši od dana operacije (0. dan). Bolesnici će biti isključeni iz jednogodišnjeg praćenja ako su umrli unutar 30 dana od indeksne operacije. Mogu se zaposliti dodatni suradnici koji će pomoći u jednogodišnjem prikupljanju podataka nakon početka razdoblja praćenja (31. srpanj 2024).

Lokalni dogovori za uspješno 30-dnevno i jednogodišnje praćenje mogu uključivati: pregled bilješki bolesnika, pregled statusa bolesnika u ambulantama ili telefonskim razgovorom nakon 30 dana (ako je to uobičajena praksa) i provjeru ponovnog prijema putem primopredajnih lista. Praćenje treba provoditi u skladu s trenutnom rutinskom praksom svake bolnice. Nije potrebno dodatno praćenje putem telefona, osobno ili putem upitnika. Izvorni podaci mogu se dobiti iz bolničkih bilješki, kliničkih elektroničkih sustava ili ambulantnih pisama.

Ključ uspješnog jednogodišnjeg praćenja:

1. *Osigurajte popis svih osobnih podataka bolesnika i odgovarajućeg RedCap osobnog računa bolesnika na sigurnom računalu kako biste omogućili praćenje ovih bolesnika. Planira se podatke pohraniti u obliku šifrirane proračunske tablice koju član tima za prikupljanje podataka (voditelj bolnice, nadzorni konzultant/nadležni liječnik ili službenik za reviziju) sigurno čuva na računalnoj mreži lokalne bolnice.*
2. *Gdje se očekuje kako će bolnički voditelj prijeći u drugu bolnicu, nadzorni konzultant treba omogućiti sigurno pohranjivanje osobnih podataka bolesnika i odgovarajućeg RedCap osobnog računa bolesnika.*
3. *Osigurajte kod ureda za reviziju/lokalnih upravnih tijela činjenicu kako je ovo prospektivna studija.*
4. *U centrima s velikim volumenom može se dopustiti uključivanje dodatnih članova tima za pružanje podrške.*

Tablica 1. Razdoblja prikupljanja podataka

DATUMI	OPIS
00:00 31. srpanj – 23:59 13. kolovoz 2023	Prikupljanje podataka **razdoblje 1** (+ 30-dnevno praćenje: završetak 12. rujan 2023) (+ jednogodišnje praćenje: završetak 13. kolovoz 2024)
00:00 14. kolovoz – 23:59 27. kolovoz 2023	Prikupljanje podataka **razdoblje 2** (+ 30-dnevno praćenje: završetak 26. rujan 2023) (+ jednogodišnje praćenje: završetak 27. kolovoz 2024)
00:00 28. kolovoz – 23:59 10. rujan 2023	Prikupljanje podataka **razdoblje 3** (+ 30-dnevno praćenje: završetak 10. listopad 2023)(+ jednogodišnje praćenje: završetak 10. rujan 2024)
00:00 11. rujan – 23:59 24. rujan 2023	Prikupljanje podataka **razdoblje 4** (+ 30-dnevno praćenje: završetak 24. listopad 2023) (+ jednogodišnje praćenje: završetak 24. rujan 2024)
00:00 25. rujan – 23:59 8. listopad 2023	Prikupljanje podataka **razdoblje 5** (+ 30-dnevno praćenje: završetak 7. studeni 2023) (+ jednogodišnje praćenje: završetak 8. listopad 2024)
00:00 9. listopad – 23:59 22. listopad 2023	Prikupljanje podataka **razdoblje 6** (+ 30-dnevno praćenje: završetak 21. studeni 2023) (+ jednogodišnje praćenje: završetak 22. listopad 2024)
00:00 23. listopad – 23:59 5. studeni 2023	Prikupljanje podataka **razdoblje 7** (+ 30-dnevno praćenje: završetak 5. Prosinac 2023) (+ jednogodišnje praćenje: završetak 5. studeni 2024)
00:00 6. studeni – 23:59 19. studeni 2023	Prikupljanje podataka **razdoblje 8** (+ 30-dnevno praćenje: završetak 19. prosinac 2023) (+ jednogodišnje praćenje: završetak 19. studeni 2024)

OSIGURANJE KVALITETE

Dizajn projekta

Kako bi se osigurala visoka kvaliteta podataka, ovaj je protokol napisan uz vodstvo stručne savjetodavne skupine za više specijalnosti i objavljen na internetu. Izvršit će se prijevodi protokola na više uobičajenih jezika kako bi se suradnicima olakšalo razumijevanje.

Uključivanje bolesnika i javnosti

O važnosti ovih istraživačkih tema raspravljalo se s bolesnicima koji su imali žučni kamenac. Smatralo se da su sve ove teme važne i relevantne za bolesnike. Uključit ćemo kontakt s bolesnicima tijekom cijele studije i izradit ćemo materijale za bolesnike nakon analize podataka.

Obuka

Zemlje s više lokacija bit će dodijeljene nacionalnom voditelju, koji će biti odgovoran za koordinaciju više timova na svim lokacijama kako bi se osiguralo da ne dođe do dupliciranja podataka. **GECKO** nacionalni voditelji potiču se da održe svi lokalni sastanci sa suradničkim timovima kako bi bili u tijeku s protokolom, kao i da daju povratne informacije o svim lokalnim problemima ili pitanjima postavljenim središnjem upravljačkom timu.

Provjera valjanosti podataka

Sadašnja metodologija suradnje široko je potvrđena na više skupova podataka, kako na nacionalnoj razini u Ujedinjenom Kraljevstvu i Irskoj, tako i na međunarodnoj razini, pokazujući visoke razine utvrđivanja slučajeva, obično veće od 90% i točnost podataka veću od 95% [**16**]. Stoga je validacija podataka vrlo važna za ovu kohortnu studiju.

Validacija od strane primarnih timova za prikupljanje podataka:

- Metodologija praćenja na razini bolesnika: sve će bolnice same prijaviti metode korištene za određivanje 30-dnevnih ishoda.
- Metodologija identifikacije bolesnika: sve će bolnice same prijaviti metode korištene za

identifikaciju bolesnika koji ispunjavanju kriterije uključenja.

- Utvrđivanje slučaja: bolnička dokumentacija će se pregledati kako bi se identificirali bolesnici koji ispunjavaju kriterije uključenja unutar dvotjednog perioda prikupljanja podataka i uspoređujući to sa stvarnim brojem prijavljenih slučajeva. To će obavljati osobe koje nisu uključene u prikupljanje primarnih podataka. Usporedbom uzoraka središnji tim za podatke izradit će kvantitativnu procjenu utvrđivanja slučaja.

- Točnost podataka: prikupljene varijable potvrdit će pojedinci koji su neovisni o primarnom procesu prikupljanja podataka. Nakon faze "utvrđivanja slučaja", od validatora će se tražiti da daju podatke za skupinu varijabli, dvije varijable bolesnika, dvije varijable operacije i dvije mjere ishoda.

Struktura projektnog tima

Svaki registrirani centar mora imati nadzornog specijalistu kako bi se osigurala odgovarajuća kvaliteta podataka. U slučaju da je voditelj bolnice specijalizant, tada se mora angažirati specijalist za nadzor studije. Voditelj bolnice također bi trebao osigurati neovisnog validatora podataka (specijalist/pomoćno osoblje) za provođenje validacije podataka opisanih u gornjem odjeljku. Za prikupljanje podataka, voditelj bolnice trebao bi zaposliti "mini-tim" od najviše pet lokalnih suradnika za svako razdoblje prikupljanja podataka (**Tablica 1; strana 15**).

Studenti medicine, liječnici i medicinske sestre mogu djelovati kao lokalni suradnici i njihovo se sudjelovanje potiče. Isti "mini-tim" može pokrivati različita vremenska razdoblja u svakoj bolnici ako to želi. Svaki tim trebao bi uključivati barem jednog kvalificiranog liječnika koji će pružiti dodatnu lokalnu podršku studentima medicine ili medicinskim sestrama koji sudjeluju. Mogu se zaposliti dodatni suradnici koji će pomoći u jednogodišnjem prikupljanju podataka nakon praćenja nakon početka razdoblja praćenja (31. srpnja 2024.). Detaljnu specifikaciju svake uloge možete pronaći u nastavku (**strana 23-24**).

STATISTIČKA RAZMATRANJA

Mjere primarnog ishoda

Primarni ishod ove studije je usklađenost sa standardima revizije prije, unutar i poslije operacije (**strana 9-10**).

Mjere sekundarnog ishoda

Sekundarni ishodi uključuju:

- Stopu postizanja kritičkog pogleda na sigurnost.
- Stopu različitih postupaka koji su pokrenuti u slučajevima ugroze sigurne kolecistektomije.
- Stopu 30-dnevnih i jednnogodišnjih ishoda [**2**] nakon kolecistektomije, uključujući: postoperativne komplikacije (Clavien-Dindo klasifikacija), intraoperativne komplikacije (ozljede žučnog kanala i vaskularne ozljede), duljinu boravka u bolnici, stopu ponovnog zaprimanja u bolnicu, mortalitet, i stopu postoperativnih dijagnostičkih postupaka i intervencija.
- Stopu zloćudnih novotvorina žučnog mjehura, uključujući: (1) stopu komplikacije (Clavien-Dindo klasifikacija); (2) stopu recidiva (vrijeme od operacije do recidiva); and (2) stopu revizijskih operacija (resekcija jetre, resekcija žučnog voda i/ili disekcija limfnih čvorova).
- Opis globalnih varijacija u dostupnosti kolecistektomije, obuke I održive prakse.

KONTROLA PRISTRANOSTI

Prikupljat će se podatci o revizijskim standardima i čimbenicima za analizu prilagođenu riziku. To uključuje dob, spol, indeks tjelesne mase, ocjenu Američkog društva anesteziologa i relevantne komorbiditete. Također će se prikupiti varijable uključujući hitnost operacije, operativnu kontaminaciju i operativni pristup. Bez odgovarajuće prilagodbe čimbenicima rizika, vjerojatno bi svi nalazi bili pristrani i ne bi se mogli prikladno analizirati na međunarodnoj razini. Potpuni popis potrebnih podataka dostupan je u Dodatku B I u bazi podataka REDCap.

Analiza podataka I veličina uzorka

Varijacije u različitim međunarodnim zdravstvenim postavkama testirat će se korištenjem indeksa ljudskog razvoja [**17**], složene statistike očekivanog životnog vijeka, obrazovanja i indeksa prihoda koju objavljuju Ujedinjeni narodi. U početku će se podatci prikazivati pomoću deskriptivnih analiza. Usporedbe između grupa vršit će se korištenjem odgovarajućih parametrijskih i neparametrijskih testova.

Višerazinski logistički regresijski multivarijantni modeli bit će konstruirani kako bi se uzela u obzir kombinacija slučajeva, sa stratifikacijom stanovništva po bolnici i zemlji kao slučajnim varijablama. Nadalje, predspecificirane podskupinske analize napravit će se prema operativnom pristupu (otvoreni, laparoskopski i konvertirani),te operativnoj hitnosti (elektivna, hitna i odgođena operacija). Standardi revizije (**strana 9-10**) i istraživačko mjesto (**Dodatak C**) vodit će istraživačku analizu globalnih varijacija u pružanju kolecistektomije i dostupnih resursa. Međutim, priznaje se da su neki revizijski standardi dizajnirani za okruženja s visokim prihodima i stoga se njihovo postizanje neće smatrati obvezatnom ili potencijalno konačnom mjerom kvalitete u globalnoj kolecistektomiji.

Identifikacija učinka specifičnog za bolnicu ili kirurga neće biti prijavljena. Nakon analize, rezultati će biti vraćeni sudionicima na razini centra, ali neće biti moguće identificirati druge centre. Na temelju prethodnih studija GlobalSurga [**14-16**], **GECKO** predviđa uključiti oko 500 centara diljem svijeta. Uzimajući u obzir nedavne podatke dobivene prethodnim zajedničkim studijama [**3,5**] na kolecistektomiji predviđa se uzorak od oko 15000 bolesnika. Nedavne praktične smjernice od više društava o prevenciji ozljeda žučnih vodova [**8**] savjetuju kako bi studija koja ima odgovarajuću snagu za otkrivanje i izvješćivanje o ozljedi žučnog kanala zahtijevala najmanje 9000 bolesnika.

UPRAVLJANJE PODATCIMA

Podaci će se prikupljati i pohranjivati online putem sigurnog poslužitelja koji pokreće web aplikaciju Research Electronic Data Capture (REDCap) [**18**]. REDCap omogućuje suradnicima unos i pohranu podataka u siguran sustav. Suradnici će dobiti sigurne podatke za prijavu na projektni poslužitelj REDCap, što će omogućiti sigurno anonimizirano pohranjivanje podataka u bazi podataka REDCap. Uslugom upravlja Global Surgery REDCap sustav čiji je domaćin Sveučilište u Edinburghu, Ujedinjeno Kraljevstvo. Sigurnost sustava baze podataka studija regulirana je politikom Sveučilišta u Edinburghu. To uključuje najbolje prakse kao što su mrežni vatrozidi, nadzor sustava i sigurnosti te dvofaktorska autentifikacija. Pristup REDCap-u održavat će Jedinica za globalnu kirurgiju NIHR-a kako bi se osiguralo da korisnici mogu pristupiti samo podatcima relevantnim za njihovu stranicu. Odnosno, podatke s jednog mjesta ne mogu pregledavati sakupljači podataka s drugog mjesta, lokalni će podatci biti dostupni samo lokalnim suradnicima i timu za analizu podataka. Pristup suradnika bit će ograničen samo na njihovu stranicu. Osoblje koje se bavi prikupljanjem podataka su studenti medicine i zdravstveno osoblje (specijalisti i liječnici na licu mjesta). Nema novih podataka prikupljenih izravno od bolesnika; prikupljat će se podatci iz rutinske prakse. Imenovani specijalist ili nadležna osoba osigurat će potpunost i točnost podataka, a prikupljanje podataka dovršit će tim lokalnih kirurških pripravnika ili studenata medicine koji rade u toj bolnici.

Kreirali smo riječnik (**Dodatak B**) prije početka prikupljanja podataka koji uključuje samo polja koja bi bila potrebna za analizu. Suradnici mogu unijeti podatke izravno u REDCap ili koristiti papirnate obrasce za prijavu slučaja (**Dodatak A**), iako se prvi potiče. Suradnici su dužni sve papire s osobnim podatcima ostaviti u za to predviđenom sigurnom prostoru (zaključanoj prostoriji ili ormaru) dok ih ne koriste.

Informacije kojima se mogu identificirati bolesnici bit će svedene na dob i spol. Nikakvi podatci koji se mogu identificirati nisu bitni za navedenu svrhu ove studije. Međutim, spol i dob koristit će se za identifikaciju ukupne demografije ispitivane populacije i bitan preduvjet za smislenu analizu naših podataka. Ove podatkovne točke predstavljaju zanemariv rizik od nenamjerne identifikacije bolesnika. Suradnici će prije početka projekta dobiti individualne, jedinstvene, sigurne podatke za prijavu s lozinkom na poslužitelj projekta REDCap. Lozinke se pohranjuju kao šifrirani jednosmjerni hash lozinke. Korisnici se automatski odjavljuju nakon 30 minuta bez aktivnosti. Pristup će biti opozvan nakon završetka prikupljanja podataka i praćenja. Sav prijenos i pohranjivanje informacija temeljenih na webu

putem ovog mrežnog sustava je šifrirano i dizajnirano je da bude u skladu sa HIPAA-sigurnosnim smjernicama [**18**].

DODATAK A: OBRAZAC ZA PRIKAZ SLUČAJA

GECKO Case Report Form (CRF)

Use with Appendix B (Data Dictionary) to help data collection.

REDCap unique ID	
Data collection period	

Section 1: Pre-operative data fields

Age		**Sex**	◻ M ◻ F	**ASA**	◻ I ◻ II ◻ III ◻ IV ◻ V	**BMI**	_ _ . _ (1dp)
Frailty	◻ 1 ◻ 2 ◻ 3 ◻ 4 ◻ 5 ◻ 6 ◻ 7 ◻ 8 ◻ 9						

Comorbidities (Tick all that apply)	◻ MI ◻ CHF ◻ PVD ◻ CVA/TIA ◻ Dementia ◻ COPD ◻ CTD ◻ PUD ◻ Hemiplegia ◻ Leukaemia ◻ Lymphoma ◻ AIDS	**History of prior attacks of cholecystitis or cholangitis**	◻ Yes ◻ No
	Diabetes mellitus: ◻ Diet controlled ◻ Uncomplicated ◻ End-organ damage		
	Liver disease: ◻ Mild ◻ Moderate ◻ Severe		
	CKD: ◻ I ◻ II ◻ IIIa ◻ IIIb ◻ IV ◻ V	**Number of admissions with biliary symptoms in previous 12 months prior to surgery**	_ _
	Solid tumour: ◻ Localised ◻ Metastatic		
	◻ None of the Above		
Preoperative imaging (Tick all that apply)	**USS**: ◻ Yes ◻ No - not available ◻ No - not indicated ◻ No - patient declined ◻ Unknown **CT**: ◻ Yes ◻ No: not available ◻ No: not indicated ◻ No: patient declined ◻ Unknown **MRCP**: ◻ Yes ◻ No: not available ◻ No: not indicated ◻ No: patient declined ◻ Unknown **ERCP**: ◻ Yes ◻ No: not available ◻ No: not indicated ◻ No: patient declined ◻ Unknown **EUS**: ◻ Yes ◻ No: not available ◻ No: not indicated ◻ No: patient declined ◻ Unknown **HIDA**: ◻ Yes ◻ No: not available ◻ No: not indicated ◻ No: patient declined ◻ Unknown		
Imaging findings	◻ Gallstones ◻ Thick-walled gallbladder ◻ Pericholecystic fluid ◻ CBD stones ◻ Dilated CBD (**Diameter:** _ _ . _ mm (1dp))		
Days between	**First symptom onset and diagnosis**: _ _ _ **Diagnosis and decision to operate**: _ _ _ **Decision to operate and surgery**: _ _ _	**Urgency of surgery**	◻ Elective ◻ Delayed ◻ Emergency (**patient was on elective waiting list?** ◻ Yes ◻ No)
Indication for surgery	◻ Acute calculous cholecystitis (**Tokyo grade:** ◻ I ◻ II ◻ III; **Was Tokyo grade documented in notes:** ◻ Yes ◻ No) ◻ Biliary colic ◻ Acalculous cholecystitis ◻ Chronic cholecystitis ◻ CBD stone ◻ Polyp ◻ Dyskinesia ◻ Gallstone pancreatitis (**Atlanta criteria:** ◻ Mild ◻ Mod ◻ Severe; **Was Atlanta criteria documented in notes:** ◻ Yes ◻ No)		

Section 2: Intraoperative data fields

Mode of anaesthesia (Tick all that apply)	◻ Local (**Route:** ◻ Subcutaneous ◻ Intraperitoneal) ◻ Regional (**Route:** ◻ spine-related ◻ regional nerve block) ◻ Sedation ◻ General inhaled (**Type:** ◻ sevoflurane ◻ halothane ◻ desflurane ◻ N2O ◻ isoflurane) ◻ Total Intravenous Volatile Anaesthetic	**Intraoperative antibiotics**	◻ Yes - Prophylactic ◻ Yes – Intra-op spillage ◻ Yes – cholecystitis ◻ No
Primary operator	◻ Consultant or attending (**Specialty:** ◻ General ◻ OG ◻ HPB ◻ Colorectal ◻ Breast ◻ Vascular ◻ Other ◻ Surgical trainee (**Grade:** ◻ Senior ◻ Junior; **Training operation?** ◻ Yes ◻ No; **Consultant present?** ◻ Yes ◻ No) ◻ Non-surgeon **Number of cholecystectomies performed by primary surgeon prior to this procedure:** ◻ 0-50 ◻ 51-100 ◻ 101-200 ◻ >200		
Operative approach	◻ Open (**Why?** ◻ No laparoscopy ◻ Surgeon not trained in laparoscopy ◻ Laparoscopy broken ◻ Previous surgeries ◻ Disease severity) ◻ Laparoscopic (**Type:** ◻ Standard ◻ SILS; **Converted to open?** ◻ Yes ◻ No; **Gasless?** ◻ Yes ◻ No; **Reusable equipment:** ◻ Yes ◻ No) ◻ Robotic (**Type:** ◻ Standard ◻ SILS; **Converted to open?** ◻ Yes ◻ No; **Gasless?** ◻ Yes ◻ No; **Reusable equipment:** ◻ Yes ◻ No) **If converted to open, why?** ◻ Suboptimal view ◻ Adhesions ◻ Unable to safely dissect CVS ◻ Suspected BDI ◻ Pneumoperitoneum not tolerated ◻ Bleeding ◻ Bowel injury ◻ Equipment failure ◻ Suspected or actual cholecystoduodenal or cholecystocolonic fistula		

Intraoperative difficulty (Nassar)	◻ I ◻ II ◻ III ◻ IV ◻ V	**CVS obtained successfully?**	◻ Yes ◻ No **If No, which criteria was met?** ◻ Clearance of the hepatocystic triangle ◻ Exposure of the lower cystic plate ◻ Only two structures are attached to the gallbladder	**Was there a time-out to verify CVS?**	◻ Yes ◻ No
Operation performed	◻ Total cholecystectomy (**Type:** ◻ Standard ◻ Fundus-first approach) ◻ Subtotal cholecystectomy (**Type:** ◻ Reconstituting ◻ Fenestrated) ◻ Not performed (◻ Diagnostic laparoscopy ◻ Cholecystostomy)	**Abdominal drain**	◻ Yes ◻ No	**Anatomical biliary variant**	◻ Yes ◻ No
Intraoperative CBD assessment (Tick all that apply)	◻ Intraoperative cholangiogram ◻ Incisionless fluorescent cholangiography ◻ Laparoscopic US **Decision:** ◻ Selective ◻ Routine; **If selective, indication:** ◻ Raised LFT ◻ BDI concern ◻ Pre-op imaging suggests CBD stone **Findings:** ◻ Stone ◻ No stone; **If stone, management:** ◻ Flushing with saline and smooth muscle relaxant ◻ Fogarty catheter trawl ◻ Basket retrieval ◻ Choledocholescope ◻ No intraoperative treatment attempted				
CBD exploration	◻ Yes (**Type:** ◻ Trancystic ◻ Choledochotomy; **If Choledochotomy, closure:** ◻ Primary closure ◻ T-tube) ◻ No	**Operative contamination**	◻ Clean ◻ Clean-Contaminated ◻ Contaminated ◻ Dirty		
Intraoperative complications – *excluding BDI* (see section 4)	◻ Bile spilt ◻ Stones Spilt ◻ Bleeding ◻ Major vascular injury ◻ Bowel injury	**Reusable gowns**	◻ Yes (◻ All staff ◻ some staff) ◻ No	**Reusable drapes**	◻ Yes ◻ No

Section 3: 30-day outcomes

Highest 30-day Clavien-Dindo (CD)	◻ 0 ◻ I ◻ II ◻ IIIa (**Radiological drainage?** ◻ Yes ◻ No) ◻ IIIb (**Re-operation?** ◻ Yes ◻ No) ◻ IVa ◻ IVb ◻ V (**Postop day of death:** _ _)	**Critical care admission**	◻ Yes (**Length of stay:** _ _) ◻ No	**Re-imaging**	◻ Yes (**Type:** ◻ USS ◻ CT ◻ MRI ◻ ERCP) ◻ No
30-day postoperative Complications (Tick all that apply)	◻ Surgical site infection (**CD Grade:** ◻ I ◻ II ◻ IIIa ◻ IIIb ◻ IVa ◻ IVb ◻ V) ◻ Pulmonary complications (**CD Grade:** ◻ I ◻ II ◻ IIIa ◻ IIIb ◻ IVa ◻ IVb ◻ V) ◻ Bile leak (**CD Grade:** ◻ I ◻ II ◻ IIIa ◻ IIIb ◻ IVa ◻ IVb ◻ V) ◻ Bleeding (**CD Grade:** ◻ I ◻ II ◻ IIIa ◻ IIIb ◻ IVa ◻ IVb ◻ V) ◻ Intra-abdominal collection (**CD Grade:** ◻ I ◻ II ◻ IIIa ◻ IIIb ◻ IVa ◻ IVb ◻ V) ◻ Acute pancreatitis (**CD Grade:** ◻ I ◻ II ◻ IIIa ◻ IIIb ◻ IVa ◻ IVb ◻ V)				
Length of stay	◻ Same day discharge ◻ Admitted (Number of days inpatient: _ _)	**30-day Readmission**	◻ Yes (**Length of stay:** _ _) ◻ No		

Section 4: BDI data fields							
BDI identified within 30-days of index cholecystectomy	◻ Yes (if yes, please fill in the rest of the data points below) ◻ No (**Was BDI identified within one-year of index cholecystectomy**: ◻ Yes ◻ No (if yes, please fill in the rest of the data points below)						
Presentation of BDI	◻ Intraoperatively ◻ Controlled bile leak from abdominal drain ◻ Abdominal pain due to uncontrolled bile leak ◻ Obstructive jaundice or cholangitis ◻ Intra-abdominal abscess or biloma				**Days from index cholecystectomy to diagnosis (0 = intraoperatively)**	_ _	
BDI grade (Strasberg)	◻ A ◻ B ◻ C ◻ D ◻ E1 ◻ E2 ◻ E3 ◻ E4 ◻ E5	**Concomitant vascular injury**	◻ Yes (◻ Right hepatic artery ◻ Common hepatic artery ◻ Main portal vein ◻ Right portal vein) ◻ No				
Imaging modality to investigate and confirm BDI	◻ None ◻ OTC ◻ USS ◻ MRCP ◻ CT ◻ ERCP ◻ PTC ◻ Nuclear medicine scan ◻ Functional liver scan ◻ Tubogram			**Discussion with specialist HPB centre**	◻ Yes (**Days from injury to referral**: _ _ ; **Transferred?** ◻ Yes ◻ No) ◻ No ◻ Not required - Injury occurred at specialist HPB centre		
Management of BDI (Tick all that apply)	◻ ERCP alone (**Days after index cholecystectomy**: _ _) ◻ ERCP and stent (**Days after index cholecystectomy**: _ _) ◻ PTC (**Days after index cholecystectomy**: _ _) ◻ Washout only (**Days after index cholecystectomy**: _ _) ◻ Surgical repair (**Days after index cholecystectomy**: _ _)						
Specialty of surgeon performing BDI repair	◻ HPB surgeon ◻ UGI surgeon ◻ General surgeon	**Method of repair**	◻ Roux-en-Y Hepaticojejunostomy ◻ CBD repair without T-tube ◻ CBD repair with T-tube ◻ CBD end to end anastomosis ◻ Hepaticoduodenostomy	**Vascular repair**	◻ Yes ◻ No		If BDI surgical repair
One-year complications (Tick all that apply)	◻ Stricture formation (**Days from repair to complication**: _ _) ◻ Cholangitis (**Days from repair to complication**: _ _) Anastomotic leakage (**Days from repair to complication**: _ _) ◻ Intra-abdominal abscess or biloma (**Days from repair to complication**: _ _) ◻ Re-repair (**Days from repair to complication**: _ _)						
Section 5: Histology data fields							
Postoperative histology	◻ Not sent for examination ◻ Sent for examination (**Indication:** ◻ Routine ◻ Selective; **Days from index cholecystectomy to histology result**: _ _ ; **Result:** ◻ Benign ◻ Malignant (if malignant, please fill in the rest of the data points below)						
Staging modality	◻ CT thorax abdomen pelvis (**Days from histology to staging**: _ _) ◻ MRI liver (**Days from histology to staging**: _ _) ◻ PET-CT (**Days from histology to staging**: _ _) ◻ Staging laparoscopy (**Days from histology to staging**: _ _)						
TNM grade (AJCC 8th edition)	**T category**: ◻ Tis ◻ T1a (lamina propria) ◻ T1b (muscularis) ◻ T2a (peritoneal side) ◻ T2b (hepatic side) ◻ T3 ◻ T4 **N category**: ◻ N0 ◻ N1 (1-3 nodes) ◻ N2 (>3 nodes) **M category**: ◻ M0 ◻ M1						
Discussed at MDT	◻ Yes ◻ No	**Adjuvant treatment**	◻ No ◻ Chemotherapy ◻ Radiotherapy				
Revisional surgery	◻ Yes ◻ No – not required ◻ No – unresectable tumour						
Type of revisional surgery (Tick all that apply)	◻ Liver resection (**Extent**: ◻ Liver bed ◻ 1 segment ◻ 2 segments ◻ ≥ 3 segments) ◻ Bile duct resection ◻ Lymph node dissection	**Days from histology result to revisional surgery**	_ _				If revisional surgery
Pathology results	**Resection margin status**: ◻ R0 ◻ R1 ◻ R2 **Lymphovascular invasion**: ◻ Yes ◻ No **Perineural invasion**: ◻ Yes ◻ No						
Recurrence on imaging at one year	◻ Yes (**Days from revisional surgery to recurrence**: _ _) ◻ No						
Section 6: One-year outcomes							
Highest one-year Clavien-Dindo (CD)	◻ 0 ◻ I ◻ II ◻ IIIa (**Radiological drainage?** ◻ Yes ◻ No) ◻ IIIb (**Re-operation?** ◻ Yes ◻ No) ◻ IVa ◻ IVb ◻ V (**Postop day of death**: _ _)			**Total number of readmissions**	_ _		
One-year complications (Tick all that apply)	◻ Surgical site infection (**CD Grade**: ◻ I ◻ II ◻ IIIa ◻ IIIb ◻ IVa ◻ IVb ◻ V) ◻ Pulmonary complications (**CD Grade**: ◻ I ◻ II ◻ IIIa ◻ IIIb ◻ IVa ◻ IVb ◻ V) ◻ Bile leak (**CD Grade**: ◻ I ◻ II ◻ IIIa ◻ IIIb ◻ IVa ◻ IVb ◻ V) ◻ Biliary stricture (**CD Grade**: ◻ I ◻ II ◻ IIIa ◻ IIIb ◻ IVa ◻ IVb ◻ V) ◻ Bleeding (**CD Grade**: ◻ I ◻ II ◻ IIIa ◻ IIIb ◻ IVa ◻ IVb ◻ V) ◻ Intra-abdominal collection (**CD Grade**: ◻ I ◻ II ◻ IIIa ◻ IIIb ◻ IVa ◻ IVb ◻ V) ◻ Acute pancreatitis (**CD Grade**: ◻ I ◻ II ◻ IIIa ◻ IIIb ◻ IVa ◻ IVb ◻ V)						

DODATAK B: RIJEČNIK PODATAKA

Pre-operative Data Fields	**Required data** (definition / comment)
1. **Patient age**	**Years** (Whole years at the time of operation)
2. **Patient sex**	**Male** / **Female**
3. **ASA grade**	**I / II / III / IV / V** (**Appendix D** for definitions)
4. **Body Mass Index (BMI)**	**kg/m²** (record to one decimal places)
5. **Clinical Frailty Scale**	**1 / 2 / 3 / 4 / 5 / 6 / 7 / 8 / 9** (**Appendix D** for definitions)
6. **Comorbidities** (Select all that apply)	**Myocardial Infraction (MI) / Congestive Heart Failure (CHF) / Peripheral Vascular Disease (PVD)** **Cerebrovascular Accident (CVA) or Transient Ischaemic Attack (TIA) / Dementia /** **Chronic Obstructive Pulmonary Disease (COPD) / Connective Tissue Disease (CTD)** **Peptic Ulcer Disease (PUD) / Hemiplegia / Leukaemia / Lymphoma / Acquired Immunodeficiency Syndrome (AIDS) /** **Diabetes Mellitus** (Type 1 or Type 2). If yes: Diet-Controlled / Uncomplicated / End-Organ Damage **Solid Tumour.** If yes: Localised / Metastatic **Liver Disease.** If yes: Mild / Moderate / Severe **Chronic Kidney Disease (CKD).** If yes: Stage I / II / IIIa / IIIb / IV / V **None of the Above** Definitions: • eGFR for CKD stages: I≥ 90; II = 60-90; IIIa = 45-59; IIIb = 30-44; IV = 15-29; V <15 • Definitions for Diabetes Mellitus: Uncomplicated is defined as medically managed and no end-organ damage. • Definitions for Liver Disease: Mild defined as chronic hepatitis or cirrhosis without portal hypertension; Moderate defined as cirrhosis and portal hypertension but no variceal bleeding history; Severe defined as cirrhosis and portal hypertension with variceal bleeding history.
7. **History of prior attacks of acute cholecystitis or cholangitis**	**Yes / No**
8. **Number of admissions with biliary symptoms in previous 12 months prior to surgery**	**Number of admissions excluding the current one**
9. **Preoperative imaging** (Select all that apply)	**Yes / Unknown / No** (Not available, Not indicated, patient declined) for each of the following: **USS / CT / ERCP / MRCP / Endoscopic Ultrasound (EUS) / Hepatobiliary IminoDiacetic Acid (HIDA)**
10. **Preoperative imaging findings***	*Only for USS / CT / MRCP, what are the findings (tick all that apply): **Gallstones** **Thick-walled Gallbladder** (≥3mm or reported as thick walled) **Pericholecystic fluid** **CBD stones** **Dilated CBD.** If yes: CBD diameter (record in mm, to one decimal)
11. **Days between first biliary symptom onset and diagnosis**	**Number of days** (Whole number, day 0 is same day of first symptom onset)
12. **Days between diagnosis and decision to operate**	**Number of days** (Whole number, day 0 is same day of diagnosis) Guide for decision to operate day:

	• For elective cases this should be the day the patient was seen in the outpatient clinic. • For delayed cases this is the day the patient was LAST discharged from hospital with biliary disease. • For emergency cases this should be the day the decision was made to perform an acute cholecystectomy in that emergency admission. If the patient was previously on an elective waiting list for surgery, please still use the date it was decided to perform the operation as an emergency.
13. Days between decision to operate and surgery performed	**Number of days** (Whole number, day 0 is same day as surgery)
14. Urgency of surgery (**Appendix D** for definitions)	**Elective** **Delayed** **Emergency**. If yes: Was the patient already on the elective waiting list for surgery? (Yes / No)
15. Indication for surgery **(Appendix D** for definitions)	**Biliary colic** **Acute calculous cholecystitis.** If yes: Tokyo grade: I / II / III (Was the Tokyo grade documented in patient notes: Yes / No) **Acalculous cholecystitis** **Chronic calculous cholecystitis** **Gallstone pancreatitis.** If yes: Atlanta criteria: mild / moderate / severe (Was the Atlanta criteria documented in patient notes: Yes / No) **Common Bile Duct (CBD) stone** **Gallbladder polyp** **Dyskinesia**
Intra-operative Data Fields	**Required data** (definition / comment)
1. Mode of Anaesthesia* (Select all that apply)	**Local** (subcutaneous / intraperitoneal) **Regional** (spine-related / regional nerve block) **Sedation** (e.g., midazolam) **General Inhaled** (sevoflurane / halothane / desflurane / Nitric Oxide (N2O) / isoflurane) **Total Intravenous Volatile Anaesthetic (TIVA)** *This refers to the anaesthetic used during the operation and NOT as induction agents
2. Intraoperative antibiotics*	**Yes** (Prophylactic / Intraoperative spillage / Cholecystitis) **/ No** *Defined as administration of antibiotics at least 1 hour prior to skin incision to end of operation
3. Primary operator	**Consultant or attending** **Senior trainee** (i.e., senior registrar or resident) **Junior trainee** (i.e., junior registrar or resident) **Non-surgeon** (e.g., medical practitioner or nurse) If Consultant: What specialty? (General / Oesophago-gastric (OG) / HPB / Colorectal / Breast / Vascular / Other) If Trainee: Was this a training operation? (Yes / No). Was a consultant present? (Yes / No) If any: Number of cholecystectomies performed prior to this procedure: 0-50 / 51-100 / 101-200 / >200
4. Operative approach	**Open / Laparoscopic** (Standard / Single Incision Laparoscopic Surgery (SILS)) / **Robotic** (Standard / SILS) 1) If open, why: No laparoscopic equipment / Surgeon not trained in laparoscopy / Laparoscopy equipment broken / Multiple previous surgery / Disease severity. 2) If laparoscopic or robotic: converted to open (Yes / No), was this gasless (Yes / No), were reusable equipment used? (Yes / Some / No). 3) If converted to open, why: Suboptimal view / Adhesions / Not able to safely dissect CVS / Suspected bile duct injury / Patient unable to tolerate pneumoperitoneum / Bleeding / Bowel injury / Laparoscopic or robotic equipment failure / Suspected or actual cholecystoduodenal or cholecystocolonic fistula.
5. Intra-operative difficulty score	**I / II / III / IV / V** (Nassar Grade: **Appendix D** for definitions)
6. Was the Critical View of Safety (CVS) obtained (all three)	**Yes / No** If no, which criteria was met: 1) Clearing fat and fibrous tissue from the hepatocystic triangle. 2) The lower third of the gallbladder being cleared from the cystic plate. 3) Only two structures are attached to the gallbladder.

7. Was there a time-out to verify CVS	**Yes / No** Defined as a momentary pause that what one is seeing is likely the correct anatomy
8. Operation performed	**Standard total cholecystectomy** **Total cholecystectomy by the fundus-first (top down) approachSubtotal cholecystectomy** (reconstituting / fenestrated) **Not performed** (diagnostic laparoscopy / cholecystostomy) Definitions of subtotal cholecystectomy: • Fenestrated: does not occlude the gallbladder but may suture the cystic duct internally • Reconstituting: closes off the lower end of the gallbladder, creating a remnant gallbladder
9. Abdominal drain insertion	**Yes / No**
10. Anatomical Biliary variant	**Yes / No**
11. Intraoperative CBD Assessment	**Intraoperative cholangiogram (IOC) / Incisionless fluorescent cholangiography/ Laparoscopic ultrasound** If yes to any of the above: • Decision: Selective / Routine. If selective, state Indication: Raised liver function test / Concern of a bile duct injury / pre-operative imaging suggestive of CBD stone • Findings: Stone / No stone. If stone, tick all that apply for management: Flushing with saline and smooth muscle relaxant / Fogarty catheter trawl / Basket retrieval / Choledocholescope / No intraoperative treatment attempted
12. Common Bile Duct exploration	**Yes** (Trancystic / Choledochotomy) **/ No** If Choledochotomy then select closure: Primary closure / T-tube
13. Operative contamination	**Clean** (Gastrointestinal (GI) and genitourinary (GU) tract not entered) **Clean-Contaminated** (GI or GU tracts entered but no gross contamination) **Contaminated** (GI or GU tracts entered with gross spillage or major break in sterile technique) **Dirty** (There is already contamination prior to operation, e.g., faeces or bile).
14. Intraoperative complications - excluding bile duct injury (BDI) (Select all that apply)	**Bile spilt / Stones Spilt / Bleeding / Major vascular injury / Bowel injury**
15. Were reusable gowns used in this procedure?	**Yes** (All scrubbed staff/ some scrubbed staff) **/ No**
16. Were reusable drapes used in this procedure?	**Yes / No**
30-day Outcomes	**Required data** (definition / comment)
1. Highest 30-day Clavien-Dindo (CD) Grade	**0 / I / II / IIIa / IIIb / IVa / IVb / V** (**Appendix D** for definitions) If CD IIIa: Radiological drainage (yes / No) If CD IIIb: Re-laparoscopy (yes / No) If CD V (death): please indicate time from index cholecystectomy to death: number of days (whole number)
2. Critical care admission	**Yes / No** If yes, please indicate length of stay in critical care: number of days (whole number)
3. Re-imaging	**Yes / No** If yes then tick all that apply: USS / CT / MRI / ERCP
4. 30-day postoperative complications (Select all that apply)	**Surgical site infection** (CD Grade* I / II / IIIa / IIIb / IVa / IVb / V) **Postoperative pulmonary complications** (CD Grade* I / II / IIIa / IIIb / IVa / IVb / V) **Bile leak** (CD Grade* I / II / IIIa / IIIb / IVa / IVb / V) **Bleeding** (CD Grade* I / II / IIIa / IIIb / IVa / IVb / V)

	Intra-abdominal collection (CD Grade* I / II / IIIa / IIIb / IVa / IVb / V) **Acute pancreatitis** (CD Grade* I / II / IIIa / IIIb / IVa / IVb / V) *For all of the above, please indicate the Clavien-Dindo grade associated with that complication
5. Length of stay	**Same day discharge** **Admitted** (If admitted, please indicate number of days inpatient, considering day of surgery as day 0 to day of discharge. If the patient has not been discharged prior to the end of 30-day follow-up, enter '31').
6. Readmission within 30 days	**Yes** (Length of stay) **/ No**
Bile Duct Injury (BDI) data fields	**Required data** (definition / comment)
1. BDI identified within 30-days of index cholecystectomy	**Yes / No** If yes: please fill in the rest of the data points below. If No: **Was BDI identified within one-year of index cholecystectomy**: Yes / No (if yes, then please fill in the rest of the data points below)
2. Presentation of BDI	**Intraoperatively / Controlled bile leak from surgically placed abdominal drain /** **Abdominal pain due to uncontrolled bile leak / Obstructive jaundice or cholangitis / Intra-abdominal abscess or biloma**
3. Days from index cholecystectomy to diagnosis	**Number of days** (0 = intraoperatively)
4. Bile duct injury grade	**A / B / C / D / E1 / E2 / E3 / E4 / E5** (Strasberg Injury Grade: **Appendix D** for definition)
5. Concomitant vascular injury	**Yes** (Right hepatic artery / Common hepatic artery / Main portal vein / Right portal vein) **/ No**
6. Imaging modality to investigate and confirm BDI	**None / On-table cholangiography (OTC) / USS / MRCP / CT / ERCP / Percutaneous transhepatic cholangiography (PTC) / Nuclear medicine scan / Functional liver scan / Tubogram**
7. Discussion with a specialist HPB centre	**Yes / No / Not required** (Injury occurred at specialist HPB centre) If yes: • Transferred to specialist HPB centre: Yes / No • Time from injury to referral: number of days (whole number)
8. Management of Bile duct injury (Select all that apply)	**Non-surgery** (ERCP only / ERCP and stent / PTC) **/ Surgery** (washout only / repair) If any of the above: • **Time after index cholecystectomy**: number of days (Whole number, day of index cholecystectomy = day 0) If surgical repair: • **Specialty of surgeon performing Bile duct injury repair**: HPB surgeon / UGI surgeon / General surgeon • **Method of repair**: Roux-en-Y Hepaticojejunostomy / CBD repair without T-tube / CBD repair with T-tube / CBD end to end anastomosis / Hepaticoduodenostomy • **Vascular repair**: Yes / No • **One-year complications**: Stricture formation / Cholangitis / anastomotic leakage / intra-abdominal abscess or biloma / re-repair. If yes to any, time from repair to complication: number of days (Whole number, day of repair = day 0) Stricture definition: defined as a clinically relevant stricture leading to either jaundice, significant alterations of the liver function tests, cirrhosis or reoccurring cholangitis requiring radiological/surgical intervention or a liver failure related death
Histology data fields	**Required data** (definition / comment)
1. Postoperative histology	**Not sent for examination / Sent for examination** If sent for examination, please complete:

	• Indication: Routine / Selective • Time from index cholecystectomy to histology result: Number of days (whole number) • Result: Benign / Malignant If Malignant, please complete the rest of the data points below
2. Staging modality (select all that apply)	**CT thorax abdomen pelvis / MRI liver / PET-CT / Staging laparoscopy** For any of the above, please indicate time from histology to staging: number of days (whole number)
3. TNM grade (AJCC 8th edition) (**Appendix D** for definition)	**T category**: Tis / T1a (lamina propria) / T1b (muscularis) / T2a (peritoneal side) / T2b (hepatic side) / T3 / T4 **N category**: N0 / N1 (1-3 nodes) / N2 (>3 nodes) **M category**: M0 / M1
4. Discussed at MDT	Yes / No
5. Adjuvant treatment	No / Chemotherapy / Radiotherapy
6. Revisional surgery completed	Yes / No (not required) / No (unresectable tumour) • If yes, type of surgery (select all that apply): Liver resection (liver bed / one segment / two segments/ ≥ 3 segments) / bile duct resection / lymph node dissection • If yes, time from histology result to revisional surgery: Number of days (whole number)
7. Pathology results if revisional surgery	Resection margin status: R0 / R1 / R2 Lymphovascular invasion: Yes / No Perineural invasion: Yes / No Resection margin definition: R0 = microscopically negative for residual tumor; R1 = microscopically margins still demonstrate the presence of tumor; R2 = macroscopically-visible disease remains post-surgery.
8. Recurrence on imaging at one year	Yes / No If yes, time from revisional surgery to recurrence: number of days (whole number)
One-year Outcomes	**Required data** (definition / comment)
1. Highest one-year Clavien-Dindo (CD) Grade	**0 / I / II / IIIa / IIIb / IVa / IVb / V** If CD IIIa: Radiological drainage (yes / No) If CD IV: Re-laparoscopy (yes / No) If CD V (death): please indicate time from index cholecystectomy to death: number of days (whole number)
2. Readmissions	**Total number of readmissions**
3. One-year complications (Select all that apply)	**Surgical site infection** (CD Grade* I / II / IIIa / IIIb / IVa / IVb / V) **Postoperative pulmonary complications** (CD Grade I / II / IIIa / IIIb / IVa / IVb / V) **Bile leak** (CD Grade* I / II / IIIa / IIIb / IVa / IVb / V) **Biliary stricture** (CD Grade* I / II / IIIa / IIIb / IVa / IVb / V) **Bleeding** (CD Grade* I / II / IIIa / IIIb / IVa / IVb / V) **Intra-abdominal collection** (CD Grade* I / II / IIIa / IIIb / IVa / IVb / V) **Acute pancreatitis** (CD Grade* I / II / IIIa / IIIb / IVa / IVb / V) *For all of the above, please indicate the Clavien-Dindo grade associated with that complication

DODATAK C: ANKETA ISTRAŽIVAČKOG MJESTA

Hospital-level services	
What is your hospital type?	Tertiary / District (Rural) / District (Non-rural)
How is your hospital funded?	Public / Private / Mixed
Total number of inpatient beds	(Number)
Do you have Level 2 (HDU) or Level 3 (ITU) facilities?	Yes (Number of beds) / No
Do you have a specialised HPB team at your centre	Yes / No If yes: (i) Are there on-call services from them: Every day 24 hour / Everyday, daytime 0800 - 1700 / Weekdays, 24 hour / Weekdays, daytime 0800 - 1700 (ii) Do they have a dedicated pathway for management of bile duct injury: Yes / No If no, are there on-call surgeons specialised in HPB: Within the same city / In other city / In the region / None
Do you have access to minimally invasive surgical equipment?	Yes (Laparoscopic / Robotic) / No If yes, do you routinely take intraoperative images? Yes (Video / Photo) / No
Cholecystectomy services	
What is the approximate total number of cholecystectomies performed each year?	(Number)
What is the number of consultants/ attending surgeons who perform cholecystectomies each year?	(Number)
Which specialist consultants/ attending surgeons perform cholecystectomies each year? (select all that apply)	General / Upper GI / HPB / Colorectal / Breast / Other
What type of services for cholecystectomy services do you provide? (select all that apply)	Elective / Emergency If emergency: • What is the approximate total number performed each year? (Number) • Do you have dedicated theatres for these services? Yes (Everyday / Once a week / Once every 2 week / More than once every 2 weeks) / No
Where does cholecystectomy get performed on your site? (select all that apply)	Day unit / Elective theatre / Emergency theatre
Have you got access to intraoperative cholangiogram?	Yes - routinely / Yes - selectively / No if yes - selectively or no: What is the supply for these? Good supply / Limited supply / None
Number of consultants / attendings who perform laparoscopic cholecystectomy	(Number)
Do you routinely follow-up after cholecystostomy?	Yes - routinely / Yes - selectively / No

Diagnostic / treatment around gallbladders	
Types of diagnostic imaging available (select all that apply)	Ultrasound (On-site / Off-site) / Computer Tomography (On-site / Off-site) / MRCP (On-site / Off-site) / EUS (On-site / Off-site) / HIDA (On-site / Off-site)
Does your hospital have access to cholecystostomy for gallbladder drainage?	Yes / No If yes, are there on-call services from them: Every day 24 hour / Everyday, daytime 0800 - 1700 / Weekdays, 24 hour / Weekdays, daytime 0800 - 1700 If no, are there on-call surgeons specialised in HPB: Within the same city / In other city / In the region / None
Is there a dedicated ERCP list?	Yes (Everyday / Once a week / Once every 2 week / More than once every 2 weeks) / No
Which of the following services do you have?	Intraoperative cholangiogram / Laparoscopic ultrasound / ICG For each: Routine use / Selective use with good supply / Selective use with limited supply
Do you send gallbladders for histological examination after surgery?	Yes - routinely / Yes - selectively / Not sent for histology / No access to histology
Training in cholecystectomy	
Are there trainees in the department who perform gallbladder surgery?	Yes / No If yes: (i) How many? (Number) (ii) What is their grade? Post-training fellow / Trainee / Non-trainees or doctors
Are there facilities for simulations training for cholecystectomies?	Yes (Local hospital / Regional / National) / No If yes to either, what are the types of simulation training: Box trainer / IT simulation model / Animal model
Are there specific structured educational programmes or coaching for bile duct injury training?	Yes (Local hospital / Regional / National) / No
Green surgery for laparoscopic cholecystectomy	
Are reusable laparoscopic ports used?	Yes (Always / Sometimes) / No / Not available
Are reusable surgical instruments used?	Yes / No / Not available
Are reusable drapes used?	Yes (Always / Sometimes) / No / Not available
Are reusable gowns used?	Yes (Always / Sometimes) / No / Not available
Are reusable scrub caps provided by your hospital?	Yes – routinely / Yes - if requested / No / Not available
Are single-use instruments recycled?	Yes / No / Not available
Are "clean" paper and plastic waste recycled?	Yes / No
Is general anaesthesia given through IV rather than anaesthetic gases for environmental reasons?	Yes – routinely / Yes – occasionally / No / Not available

DODATAK D: DEFINICIJE STUDIJE

Klasifikacija Američkog društva anesteziologa

ASA Classification [**21**]	Definition	Example
I	A normal healthy patient	Healthy, non-smoking, no or minimal alcohol use
II	A patient with mild systemic disease	Mild diseases only without substantive functional limitations. Current smoker, social alcohol drinker, pregnancy, obesity (30<BMI<40), well-controlled DM/HTN, mild lung disease
III	A patient with severe systemic disease	Substantive functional limitations; One or more moderate to severe diseases. Poorly controlled DM or HTN, COPD, morbid obesity (BMI ≥40), active hepatitis, alcohol dependence or abuse, implanted pacemaker, moderate reduction of ejection fraction, ESRD undergoing regularly scheduled dialysis, history (>3 months) of MI, CVA, TIA, or CAD/stents
IV	A patient with severe systemic disease that is a constant threat to life	Recent (<3 months) MI, CVA, TIA or CAD/stents, ongoing cardiac ischemia or severe valve dysfunction, severe reduction of ejection fraction, shock, sepsis, DIC, ARD or ESRD not undergoing regularly scheduled dialysis
V	A moribund patient who is not expected to survive without the operation	Ruptured abdominal/thoracic aneurysm, massive trauma, intracranial bleed with mass effect, ischemic bowel in the face of significant cardiac pathology or multiple organ/system dysfunction

Skala kliničke nemoći

Clinical frailty scale [**22**] (nine components):

1. **Very Fit**: People who are robust, active, energetic, and motivated.
2. **Well**: People who have no severe disease symptoms but are less fit than category 1. They exercise or are very active occasionally, e.g., seasonally.
3. **Managing Well**: People whose medical problems are well-controlled but are not regularly active beyond routine walking.
4. **Living With Very Mild Frailty**: While not dependent on others for daily help, symptoms often limit activities. A common complaint is being "slowed-up" and being tired during the day.
5. **Living with Mild Frailty:** These people usually have more evident slowing and need help in higher-order instrumental activities of daily living (IADLs) such as finance, transportation, heavy housework, and medication management. Typically, mild frailty progressively impairs shopping and walking outside alone, meal preparation, and housekeeping.
6. **Living With Moderate Frailty**: People need help with all outside activities and housekeeping. Inside often have problems with stairs, need help with bathing, and may need minimal assistance with dressing.
7. **Living With Severe Frailty**: Completely dependent for cognitive and physical personal care. However, they seem stable and not at high risk of dying (within six months).
8. **Living with Very Severe Frailty**: Completely dependent for personal care and approaching end of life. Typically, they could not recover even from minor illnesses.
9. **Terminally Ill**: Approaching the end of life. This category applies to people with a life expectancy of under six months who are not otherwise living with severe frailty.

Indikacije za operaciju

Indication	Definition
Biliary colic	The presence of colicky right upper quadrant pain associated with gallstones or sludge on an USS, but no signs of acute cholecystitis [**23**]
Acute calculous cholecystitis	Clinical (right upper quadrant pain, with or without fever, WCC > 11 × 10^9/l) OR ultrasound evidence (thick walled gallbladder (≥ 3mm), OR USS tenderness over the gallbladder, the presence of gallstones) [**23,24**]
Acute acalculous cholecystitis	Clinical OR ultrasound evidence (thick walled gallbladder and/or pericholecystitis, USS tenderness over the gallbladder) in the absence of gallstones [**23**]
Chronic calculous cholecystitis	Previous clinical or ultrasound evidence (thick walled gallbladder and/or pericholecystitis, OR USS tenderness over the gallbladder OR the presence of gallstones) of cholecystitis [**23**]
Common bile duct stone	Common bile duct stones, as confirmed by before or at the time of surgery
Gallbladder polyp	Hyperechoic lesions on USS imaging which have no acoustic shadow and do not move with positional changes, with no overt features of malignancy [**25**]
Dyskinesia	Biliary like abdominal pain, occurring in a normal appearing gallbladder with a functional HIDA scan showing an abnormal gallbladder ejection fraction of less than 40% [**26,27**]

Tokyo Smjernice 2018 za stupnjevanje akutnog kolecistitisa

Tokyo guidelines 2018 grading [**24**] are listed below:

- **Grade I (mild)**: No organ dysfunction and mild inflammatory changes in the gallbladder.
- **Grade II (moderate)**:
    - Elevated WBC count (>18,000/mm3)
    - Palpable tender mass in the right upper abdominal quadrant
    - Duration of complaints >72 hours
    - Marked local inflammation (gangrenous cholecystitis, pericholecystic abscess, hepatic abscess, biliary peritonitis, emphysematous cholecystitis)
- **Grade III (severe)**:
    - Cardiovascular dysfunction: hypotension requiring treatment with dopamine ≥5 µg/kg per min, or any dose of norepinephrine
    - Neurological dysfunction: decreased level of consciousness
    - Respiratory dysfunction: PaO2/FiO2 ratio <300
    - Renal dysfunction: oliguria, creatinine >2.0 mg/dl
    - Hepatic dysfunction: PT-INR >1.5
    - Hematological dysfunction: platelet count <100,000/mm3

Revidirani Atlantski kriteriji za akutni pankreatitis

Atlanta Criteria [**28**] is listed below:

- **Mild**: No organ failure. No local complications (e.g., necrosis or collection). No systemic complications.
- **Moderate**: Transient organ failure (<48 hours) OR Local/systemic complications
- **Severe**: Persistent organ failure

Hitnost operacijskog liječenja

The urgency of index cholecystectomy is defined as [**3**]:

- Elective: planned elective admission for cholecystectomy via a routine surgical waiting list from the outpatient department only. Patients on an elective waiting list treated as an emergency should be classed as 'acute' cases.
- Delayed: all other planned cholecystectomies; for example, patients who have had one or more acute admissions with biliary symptoms, but then discharged for a planned procedure on an elective operating list.
- Emergency: emergency admission with biliary disease through the Emergency Department or primary care, and cholecystectomy performed during that emergency admission.

Nassarovo stupnjevanje težine operacijskog postupka

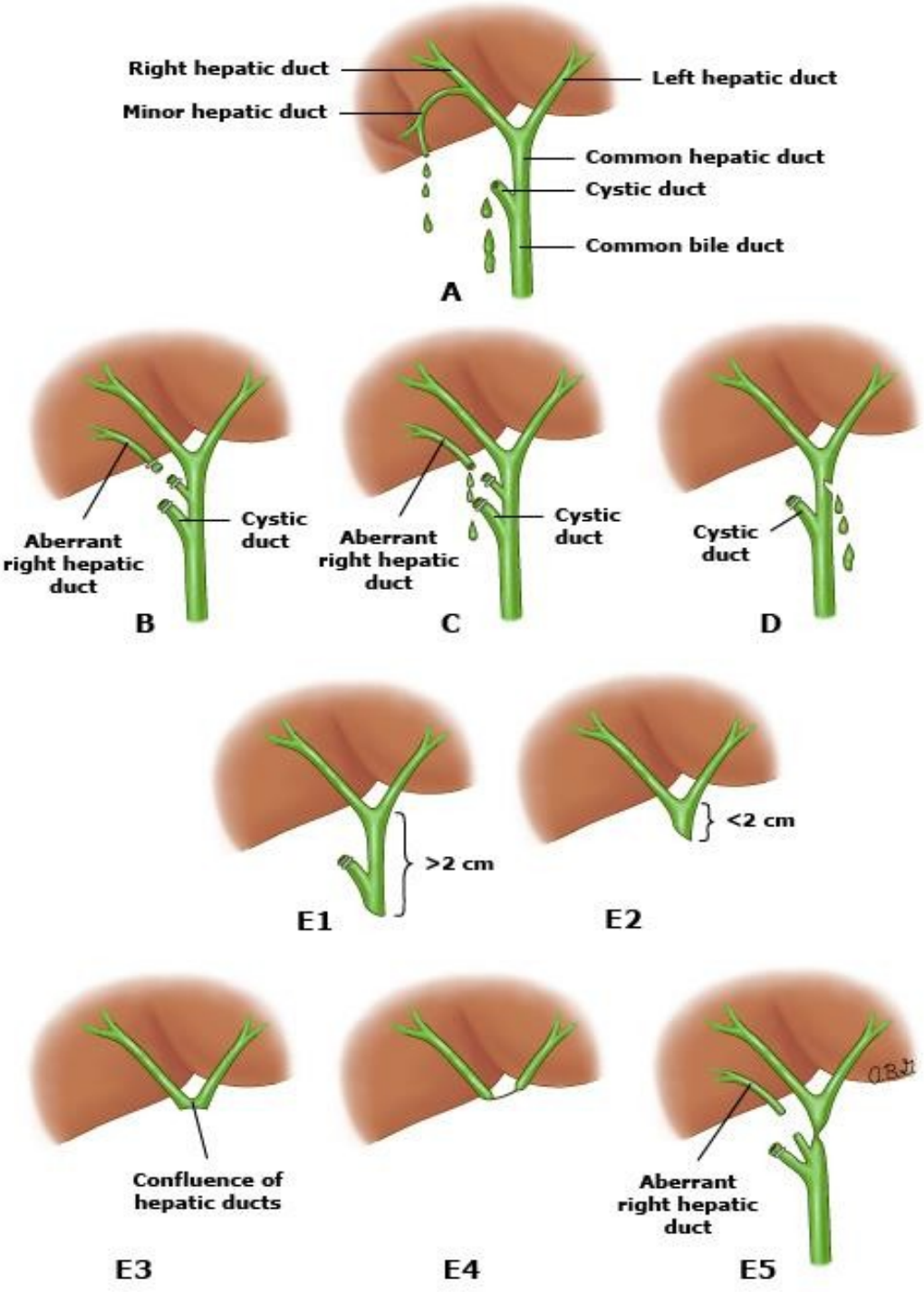
Grade [**29**]	Gallbladder	Cystic pedicle	Adhesions
I	Floppy, non-adherent	Clear, thin	Simple, up to neck and Hartmann's pouch
II	• Mucocele • Packed with stones	Fat-laden	Simple, up to the body
III	• Deep fossa • Acute cholecystitis • Contracted, fibrous Hartmann's pouch adherent to CBD or with stone impaction	• Abnormal anatomy • Cystic duct short, dilated or obscured	• Dense, up to the fundus • Involving hepatic flexure or duodenum
IV	• Completely obscured • Empyema/gangrene • Mass	Impossible to clarify	Dense, fibrous, wrapping the gallbladder. Duodenum or hepatic flexure is difficult to separate

Clavien-Dindo klasifikacija

Grade [**30**]	Definition (examples listed in italics)
I	Any deviation from the normal postoperative course without the need for pharmacological (other than "allowed therapeutic regimens"), surgical, endoscopic or radiological intervention. Allowed therapeutic regimens are: selected drugs (antiemetics, antipyretics, analgesics, diuretics and electrolyte replacement), physiotherapy and wound infections opened at the bedside but not treated with antibiotics. ***Examples**: Ileus (deviation from the norm); hypokalaemia treated with K; nausea treated with cyclizine; acute kidney injury treated with intravenous fluids.*
II	Requiring pharmacological treatment with drugs beyond those allowed for grade I complications. Blood transfusions and total parenteral nutrition are also included. ***Examples**: Surgical site infection treated with antibiotics; myocardial infarction treated medically; deep venous thrombosis treated with enoxaparin; pneumonia or urinary tract infection treated with antibiotics; blood transfusion for anaemia.*
IIIa	Requiring surgical, endoscopic or radiological intervention, not under generalAnaesthetic (GA). ***Examples**: Therapeutic endoscopic therapy (do not include diagnostic procedures); interventional radiology procedures.*
IIIb	Requiring surgical, endoscopic or radiological intervention, under GA. ***Examples**: Return to theatre for any reason.*
IVa	Life-threatening complications requiring critical care management with single organ dysfunction,or neurological complications including brain haemorrhage and ischemic stroke (excluding TIA). ***Examples**: Single organ dysfunction requiring critical care management, e.g. pneumonia with ventilator support, renal failure with filtration; SAH; stroke*
IVb	Life-threatening complications requiring critical care management with multi-organ dysfunction.
V	Death

Definicije

Complication	Definition
Surgical site infection	Purulent drainage from the incision; OR At least two of: pain or tenderness; localised swelling; redness; heat; fever; AND the incision is opened deliberately to manage infection, or the clinician diagnosesa surgical site infection; OR Wound organisms AND pus cells from aspirate/ swab.
Pulmonary complications [**31**]	Atelectasis OR pneumonia OR pulmonary aspiration OR acute respiratory distress syndrome
Bile leak	**Grade A**: bile leak which requires little or no change in the patient's management; resolves with conservative management within 1 week. **Grade B:** bile leak or collection which requires additional diagnostic or interventional procedures, such as ERCP or re-laparoscopy or Grade A bile leak which lasts more than 1 week. **Grade C:** Bile leak or collection which requires re-laparotomy.
Intra-abdominal abscess/collection	A clinical diagnosis of intra-abdominal collection (fever or abdominal pain or wound infection with dehiscence of any layer below fat/Scarpa's fascia) with operative or radiological evidence of a collection.
Acute pancreatitis [**28**]	Diagnosed using the revised Atlanta guidelines which state the diagnosis of acute pancreatitis requires two of the following three features: • Abdominal pain consistent with acute pancreatitis (acute onset of a persistent, severe, epigastric pain often radiating to the back) • Serum lipase activity (or amylase activity) at least three times greater than the upper limit of normal • Characteristic findings of acute pancreatitis on contrast-enhanced computed tomography.
Common bile duct injury [**32-34**]	Any injury to the main biliary tree will be classified using the Strasberg Classification System (see figure below): A – leak from cystic duct or small duct in liver bedB – occlusion of an aberrant right hepatic duct C – leak from an aberrant right hepatic duct D – lateral injury to the common hepatic or bile duct (<50% of circumference) E1 – transection or stricture of common hepatic or common bile duct >2cm from the hilum. E2 - transection or stricture of common hepatic duct <2cm from the hilum. E3 – Transection of the common hepatic duct at the level of the bifurcation without loss of contact between left and right hepatic duct. E4 – Transection of the common hepatic duct at the level of the bifurcation with loss of communication between the left and right hepatic duct. E5 – injury of a right segmental duct combined with an E3 or E4 injury.



Strasberg Classification System

8. izdanje TNM klasifikacije Američkog odbora za rak

Category [**35**]	Definition
T category	
Tis	Carcinoma in-situ
T1a	Limited to the lamina propria
T1b	Invades the muscle layer
T2a	Invades the perimuscular connective tissue on the peritoneal side
T2b	Invades the perimuscular connective tissue on the hepatic side
T3	Perforates the serosa and/or directly invades the liver and/or other adjacent organs or structures (stomach, duodenum, colon, pancreas, omentum, or extrahepatic bile ducts)
T4	Invades the main portal vein or hepatic artery or two or more extrahepatic organs or structures
N category	
N0	No regional metastasis
N1	Metastasis in 1-3 regional lymph nodes
N2	Metastasis in >3 regional lymph nodes
M category	
M0	No distant metastasis
M1	Distant metastasis

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