Appendix 1 R Code

R package code for inverse probability of treatment weighting (IPTW) adjusted Kaplan-Meier estimator, log-rank test, and Cox proportional hazards regression model

```
library(survminer)
library(survival)
library(tableone)
library(survey)
library(MatchIt)
library(reportReg)
library(foreign)

setwd("C:\\Users\\shilish\\Desktop\\psm")
testdata<-read.csv2("data1.1.csv",header = T,sep = ",")

testdata$DRFS<-as.numeric(testdata$DRFS)
testdata$OS<-as.numeric(testdata$OS)
testdata$RFS<-as.numeric(testdata$RFS)
testdata$DSS<-as.numeric(testdata$DSS)
testdata$LRFS<-as.numeric(testdata$LRFS)

testdata$age<-as.numeric(testdata$age)
testdata$sex<-factor(testdata$sex,labels=c("female","male"))
testdata$group<-factor(testdata$group,labels=c("A","B"))
testdata$SIZE3<-factor(testdata$SIZE3,labels=c("1","2","3"))

testdata$sym<-factor(testdata$sym,labels=c("1","2","3"))
testdata$sizeover3<-factor(testdata$sizeover3,labels=c("small","big"))
str(testdata)

fit <- survfit(Surv(DSS,DSSstatus) ~ group,
                    data = testdata)
summary(fit)
fit

ggsurvplot(fit,
           data = testdata,
           conf.int = FALSE,
           pval = TRUE,
           surv.median.line = "hv",
           risk.table = TRUE,
           xlab = "Follow up time(month)",
           legend = c(0.8,0.75),
           legend.title = "ABC",
           legend.labs = c("A", "B"),
           break.x.by = 10)
```


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```
attach(testdata)

attach(testdata)

vars<-c("sex","SIZE3")

psModel<-glm(group–sex+SIZE3,family=binomial(link="logit"),data=testdata)

testdata$ps=predict(psModel,type="response")

head(testdata$ps)

testdata$IPTW<-ifelse(testdata$group=="B",1/testdata$ps,1/(1-testdata$ps))

fit.IPTW<- survfit(Surv(DSS,DSSstatus) – group,
                   weights=testdata$IPTW,
                   data = testdata)
summary(fit.IPTW)

ggsurvplot(fit.IPTW,
           data = testdata,
           conf.int = FALSE,
           pval = TRUE,
           surv.median.line = "hv",
           risk.table = TRUE,
           xlab = "Follow up time(d)",
           legend = c(0.8,0.75),
           legend.title = "ABC",
           legend.labs = c("A", "B"),
           break.x.by = 10)

testdata1 <- testdata[testdata$Age45== "young",]
testdata2 <- testdata[testdata$Age45== "old",]

model.IPTW=coxph(Surv(DRFS,DRFSstatus)–group,data=testdata1,weights=testdata1$IPTW)
gsum=summary(model.IPTW)
gsum$coefficients
gsum$conf.int
```


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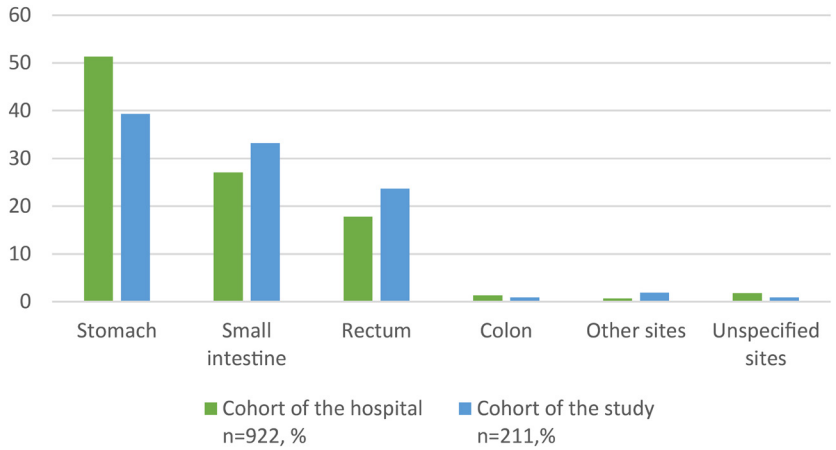

Figure S1 Distribution of anatomical location of GIST tumors in the hospital and study cohorts. GIST, gastrointestinal stromal tumor.

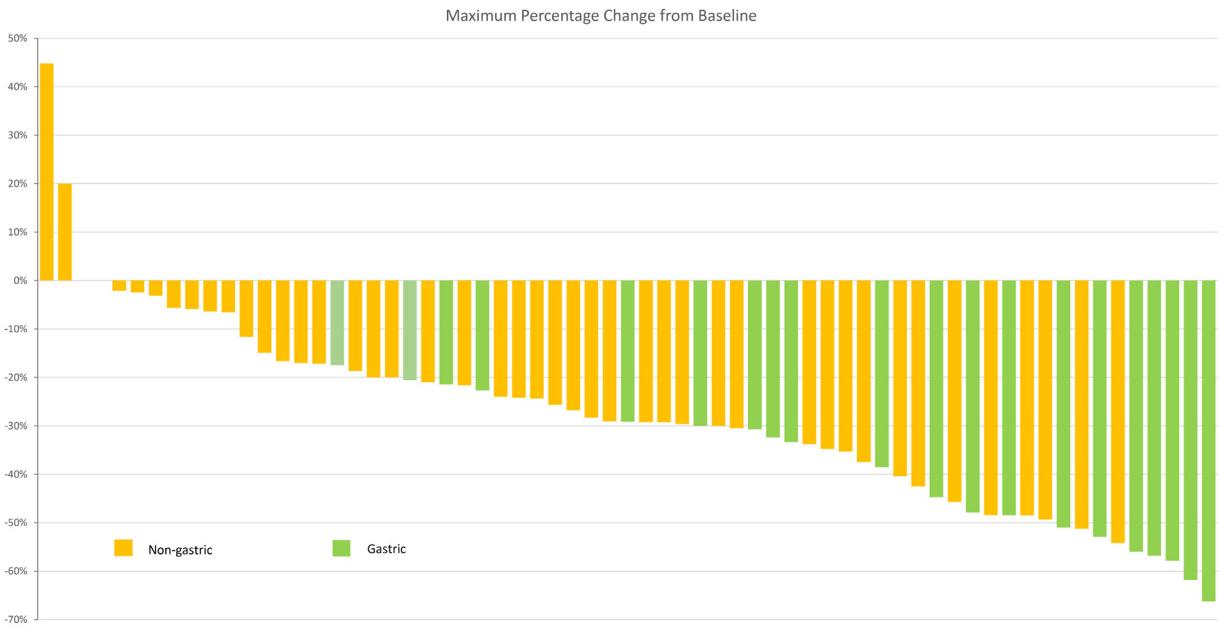

Figure S2 Decrease in the sum of lesion diameter (SLD) prior to surgery, taking as reference the baseline SLD.

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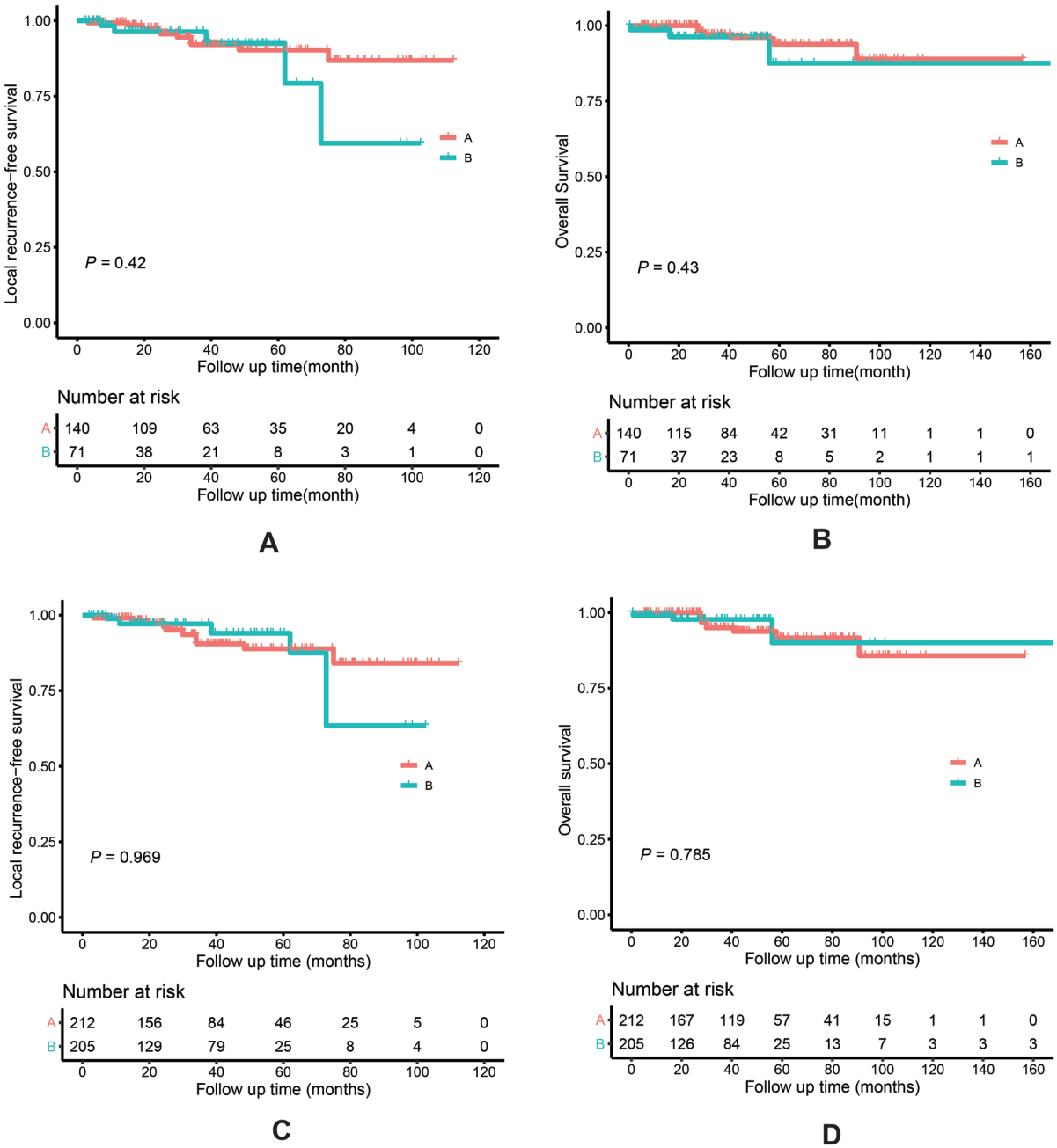

Figure S3 Kaplan-Maier analyses of original cohorts (n=211) for (A) local recurrence-free survival (LRFS), (B) overall survival (OS), and Kaplan-Maier analyses of inverse probability of treatment weighting adjusted cohorts (n=417) for (C) LRFS, and (D) OS.

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Table S1 Distribution of anatomical location of GIST tumors in the cohorts of the hospital and the study

Sites	Cohort of the hospital n=922, %	Cohort of the study n=211, %
Stomach	51.3	39.3
Small intestine	27.1	33.2
Rectum	17.8	23.7
Colon	1.3	0.9
Other sites*	0.7	1.9
Unspecified sites**	1.8	0.9

*, Other sites included esophagus, prostate and the omentum. **, The tumors were found in abdominal or pelvic cavity with unknown anatomical location.

Table S2 Risk stratification in groups A and group B

Risk stratification	Group A: UR N=140		Group B: NAT N=71		Total N=211	
	N	%	N	%	N	%
High risk	84	60	49	69	133	63
Intermediate risk	30	21.4	NA	NA	30	14.2
Low risk	25	17.9	NA	NA	25	11.9
Undetermined	1	0.7	22	31	23	10.9
Summary	140	100	71	100	211	100

UR, upfront resection; NAT, neoadjuvant therapy of imatinib; NA, not available.

Table S3 Modified NIH consensus criteria for defining postsurgical risk of recurrence in localized GIST

Risk category	Tumor longest diameter (cm)	Mitotic index, per 50 HPF	Primary tumor
Very low	<2	≤5	Any
Low	2–5	≤5	Any
Intermediate	2–5	>5	Gastric
	<5	6–10	Any
	5–10	≤5	Gastric
High	Any	Any	Tumor rupture
	>10	Any	Any
	Any	>10	Any
	>5	>5	Any
	2–5	>5	Non-gastric
	5–10	≤5	Non-gastric

HPF, high power field.

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Table S4 Outcomes correlated to adjuvant therapy

Category	Group A UR+AT, n=140 (n, %)	Group B NAT+R+AT, n=70 (n, %)	Overall study population, n=211 (n, %)	P value
DR after AT discontinuation	15 (10.7)	1 (1.4)	16 (7.6)	0.143
LR after AT discontinuation	3 (2.1)	3 (4.3)	6 (2.9)	
LR+DR after AT discontinuation	1 (0.7)	0 (0)	1 (0.5)	
Recurrence free after AT discontinuation	115 (82.1)	63 (90)	178 (84.8)	
Event In AT	6 (4.3)	3 (4.3)*	9 (4.3)	

*The 3 cases in group B discontinued adjuvant treatment due to events including 2 recurrence and 1 accidental death from a heart attack. UR, upfront resection; NAT, neoadjuvant therapy; AT, adjuvant therapy; DR, distant recurrence; LR, local recurrence; Event In AT, events occurred during AT and caused AT discontinuation.

Table S5 Distant recurrence correlated to adjuvant therapy

Category	Group A UR+AT, n=140 (n, %)	Group B NAT+R+AT, n=70 (n, %)	Overall study population, n=211 (n, %)	P value
DR after AT discontinuation	16 (11.4)	1 (1.4)	17 (8.1)	0.043
DR free after AT discontinuation	118 (84.3)	66 (94.3)	184 (87.6)	
Event In AT	6 (4.3)	3 (4.3)*	9 (4.3)	

*The 3 cases in group B discontinued adjuvant treatment due to events including 2 recurrence and 1 accidental death from a heart attack. UR, upfront resection; NAT, neoadjuvant therapy; AT, adjuvant therapy; DR, distant recurrence; Event In AT, events occurred during AT and caused AT discontinuation.

Table S6 DRFS and LRFS status in the cohort (n=211)

LRFS status	DRFS status		Sum
	No DR	DR	
No LR	180	16	196
LR	8	7	15
Sum	188	23	211

DRFS, distant recurrence free survival; LRFS, local recurrence free survival; DR, distant recurrence; LR, local recurrence.

Table S7 DRFS and LRFS status in the cohort by groups (n=211)

			DRFS status		Sum
			No DR	DR	
Group A: UR+AT	LRFS status	No LR	115	15	130
		LR	5	5	10
	Sum		120	20	140
Group B: NAT+R+AT	LRFS status	No LR	65	1	66
		LR	3	2	5
	Sum		68	3	71

DRFS, distant recurrence free survival; LRFS, local recurrence free survival; DR, distant recurrence; LR, local recurrence; UR, upfront resection; NAT, neoadjuvant therapy; AT, adjuvant therapy; R, resection.

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Table S8 P value for interaction between neoadjuvant imatinib and tumor location, calculated with Cox proportional hazards model

Variables	Category	DRFS		
		HR	95% CI	P value
NAT	Yes	0.056	0.006–0.51	0.011*
Size, cm	≤5	0.241	0.069–0.833	0.025*
	6–10	0.435	0.17–1.113	0.083
	>10			
AT	Yes	0.125	0.028–0.566	0.007*
Location	Gastric	0.271	0.078–0.939	0.039*
	Nongastric			
NAT*Location		54.95	3.199–943.785	0.006*

* denotes statistically significant; DRFS: distant recurrence-free survival.

Table S9 DRFS subgroup analysis stratified by tumor location, calculated using Cox proportional-hazards model

Location	Variable	DRFS		
		HR	95% CI	P value
Gastric	NAT	5.013	(0.822–30.556)	0.08
Nongastric	NAT	0.131	(0.017–0.989)	0.049*

* denotes statistically significant; DRFS: distant recurrence-free survival

Table S10 COX regression on treatment groups after IPTW adjustment

Variables	DRFS			LRFS			OS		
	HR	95% CI	P	HR	95% CI	P	HR	95% CI	P
Neoadjuvant imatinib	0.26	(0.076–0.905)	0.048*	1.02	(0.314–3.34)	0.969	2.039	(0.471–8.818)	0.34

*IPTW-adjustment for location, tumor size and adjuvant imatinib. IPTW, inverse probability of treatment weighting; DRFS, distant recurrence-free survival; LRFS, local recurrence-free survival.

Table S11 Size distribution in groups A and B by location

Location	Variable	Category	Group A UR+AT, n=140 n (%)	Group B NAT+R+AT, n=70 n (%)	P
Gastric	Size, cm	≤5	26 (42.6)	1 (4.5)	<0.001
		5–10	30 (49.2)	10 (45.5)	
		>10	5 (8.2)	11 (50)	
Nongastric	Size, cm	≤5	19 (24.1)	14 (29.2)	0.578
		5–10	41 (51.9)	26 (54.2)	
		>10	19 (24.1)	8 (16.7)	

UR, upfront resection; NAT, neoadjuvant therapy; R, resection; AT, adjuvant therapy.

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Table S12 High-risk in groups A and B by location

Location	Risk classification	Group A UR+AT, n=140 n (%)	Group B NAT+R+AT, n=70 n (%)	P
Gastric	High risk	15 (24.6)	14 (63.6)	0.001
	Non high or unknown	46 (75.4)	8 (36.4)	
Non-gastric	High risk	69 (87.3)	34 (70.8)	0.021
	Non high or unknown	10 (12.7)	14 (29.2)	

UR, upfront resection; NAT, neoadjuvant therapy; R, resection; AT, adjuvant therapy.

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