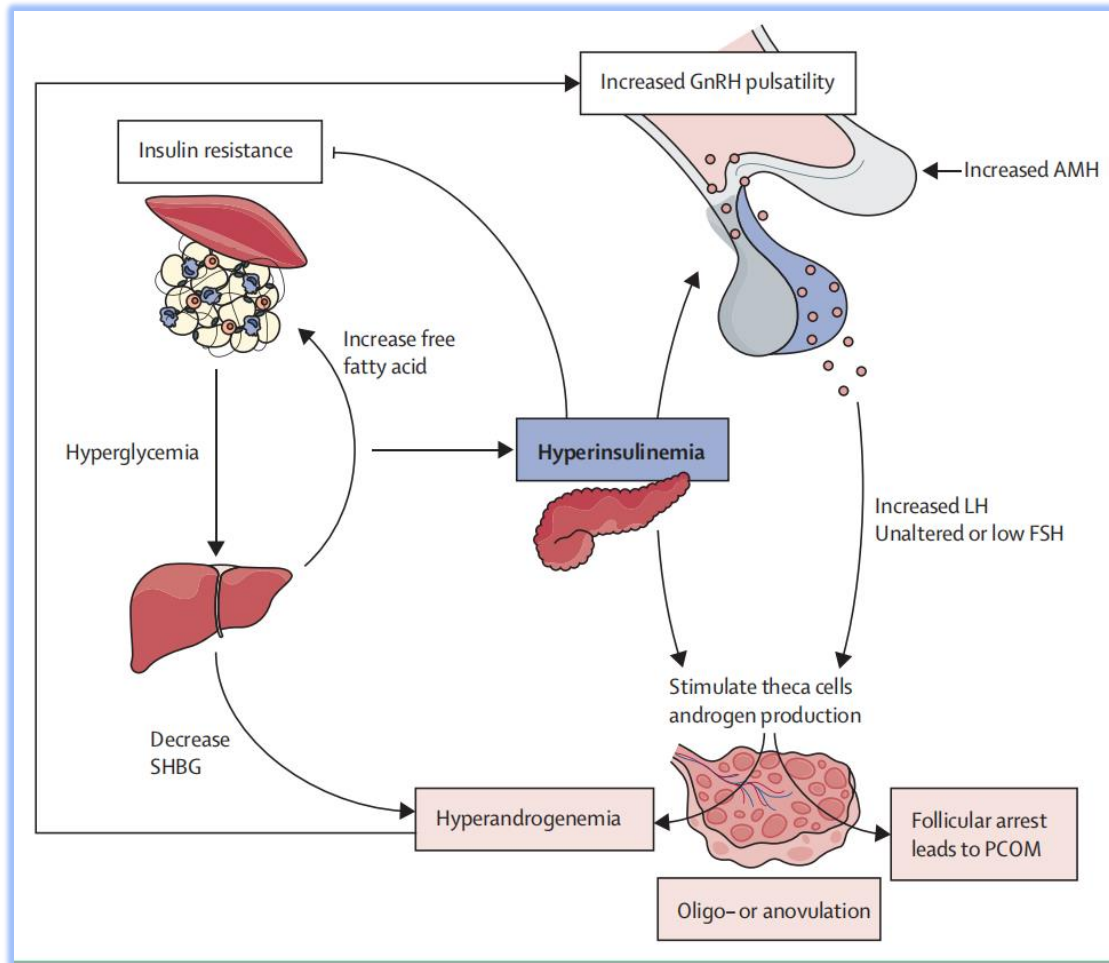山东大学齐鲁医院
QILU HOSPITAL OF SHANDONG UNIVERSITY

Nomogram to predict resumption of regular menstruation after sleeve gastrectomy in patients with polycystic ovary syndrome

Xin Huang, Yian Zhao, Shaozhuang Liu

Department of Bariatric and Metabolic Surgery, Qilu Hospital of Shandong University, China

State Key Laboratory of Diabetes and Obesity Surgery, Shandong University, China

XXVII IFSO World Congress   IFSO MELBOURNE 2024   Melbourne 2024

Xin Huang, Tao zhu, Xiaocheng Bi, Shaozhuang Liu   Qilu Hospital of Shandong University, China

Increased GnRH pulsatility

Insulin resistance

← Increased AMH

Increase free fatty acid

Hyperglycemia

Hyperinsulinemia

Increased LH
Unaltered or low FSH

Decrease SHBG

Stimulate theca cells androgen production

Hyperandrogenemia

Follicular arrest leads to PCOM

Oligo– or anovulation

Polycystic Ovary Syndrome (PCOS)

➢ 10%-13% prevalence

➢ Most common endocrinopathy in reproductive
 -aged women

➢ The pathology of PCOS
  ① insulin resistance
  ② hyperinsulinemia

➢ Diagnosis (Rotterdam criteria)
  ① oligo-/amenorrhea
  ② clinical/biochemical hyperandrogenism
  ③ polycystic ovary morphology (PCOM)

Joham AE, et al. Lancet Diabetes Endocrinol. 2022 Sep.

Rotterdam ESHRE/ASRM-Sponsored PCOS consensus workshop group. Hum Reprod. 2004 Jan.

Xin Huang, Tao zhu, Xiaocheng Bi, Shaozhuang Liu   Qilu Hospital of Shandong University, China

Recommendations from the 2023 International Evidence-based Guideline for the Assessment and Management of Polycystic Ovary Syndrome[†]

Consensus Recommendations

➢ Bariatric/ metabolic surgery could be considered to improve weight loss, hypertension, diabetes (prevention and treatment), hirsutism, irregular menstrual cycles, ovulation, and pregnancy rates in women with PCOS.

➢ PCOS is a metabolic condition and could be considered an indication at a lower BMI threshold for bariatric/ metabolic surgery similarly to other metabolic conditions including diabetes.
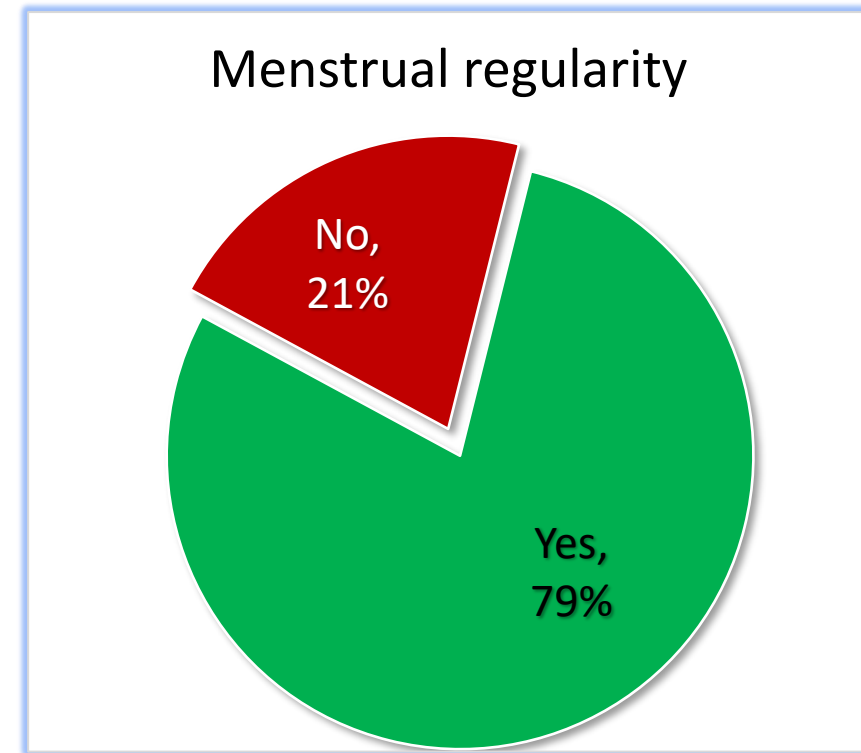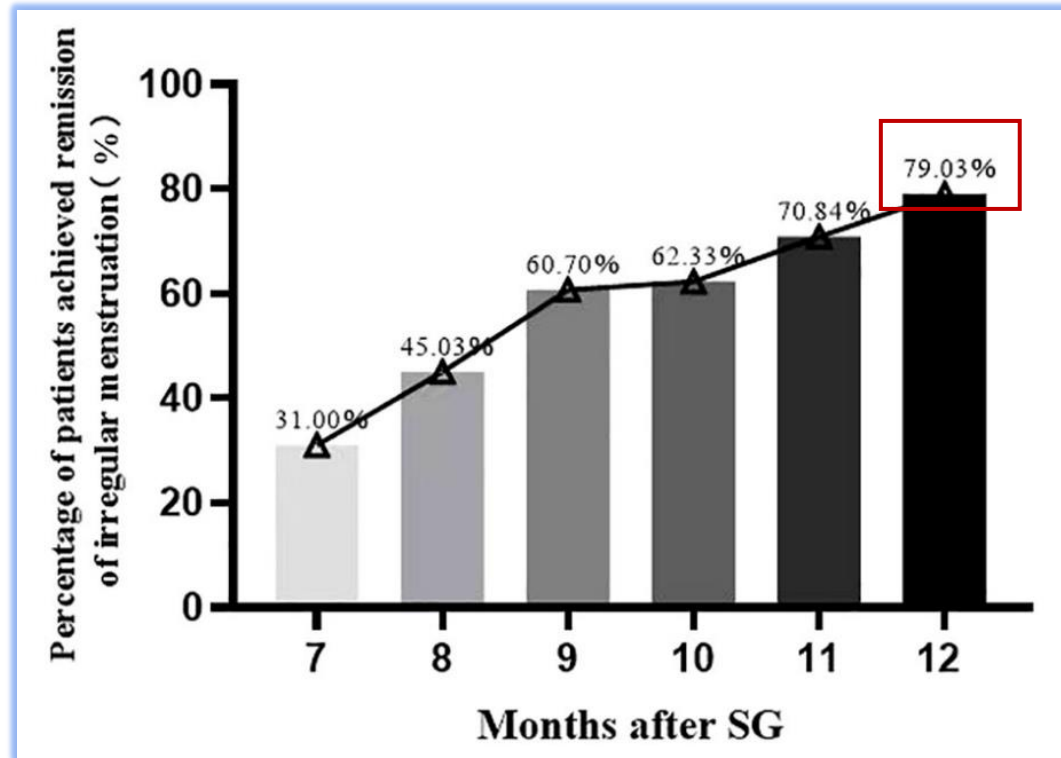
Teede HJ, et al. Hum Reprod. 2023 Sep 5.

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Multi-center, prospective cohort: Sleeve Gastrectomy for Obese PCOS (SGOP)

Clinical trial registry: Chinese Clinical Trial Registry (No. ChiCTR1900026845)

Clinicaltrials.gov (2020SDUCRCC024)

Menstrual regularity

Zhao Y, et al. Front Endocrinol (Lausanne). 2024 Mar 11.

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Question:

Is it possible to identify the population preoperatively that can/can't benefit from SG in terms of menstrual regularity?

Objective:

To develop and validate a nomogram to predict resumption of regular menstruation after SG in patients with oligo-/anovulatory PCOS.
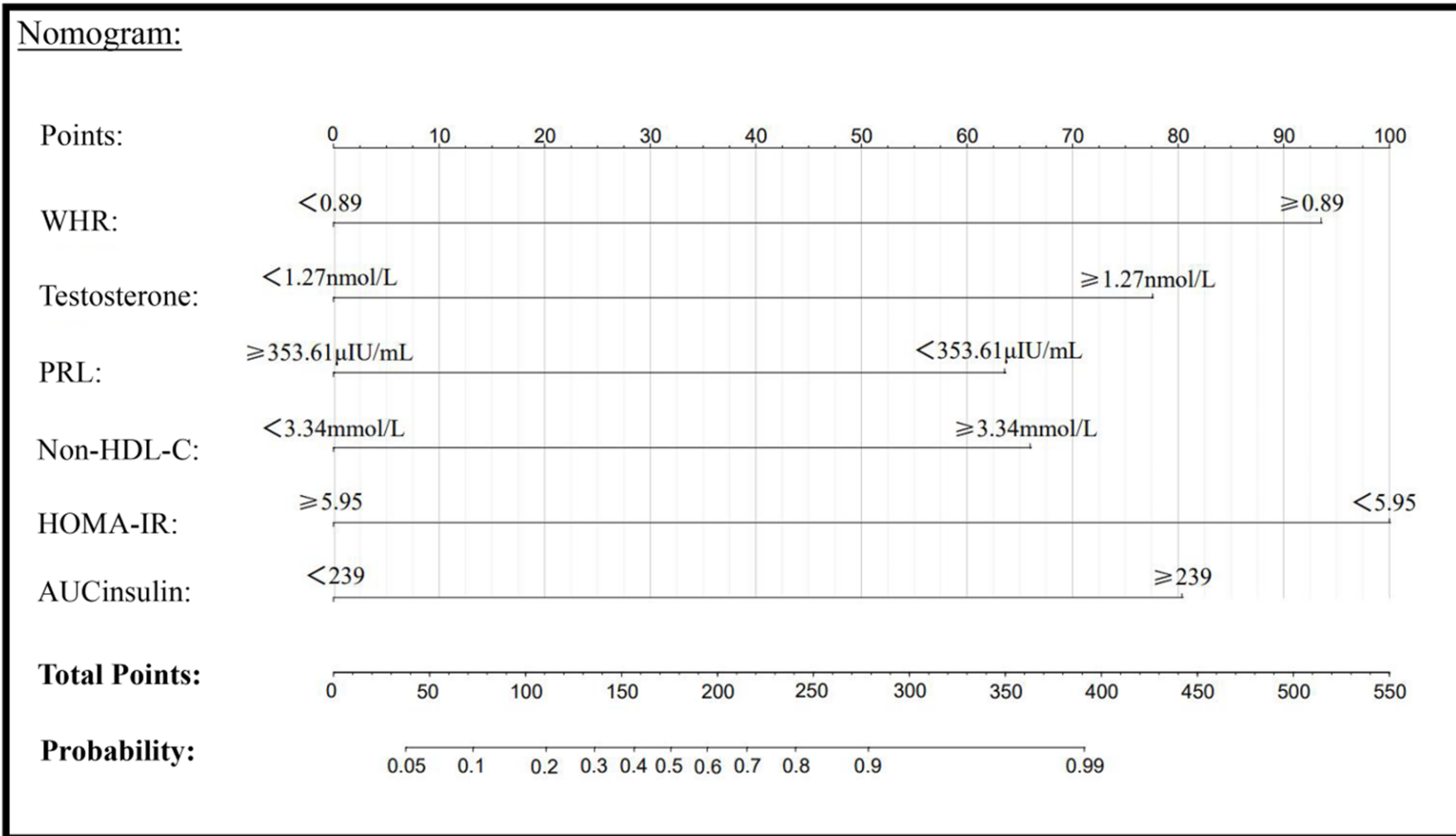
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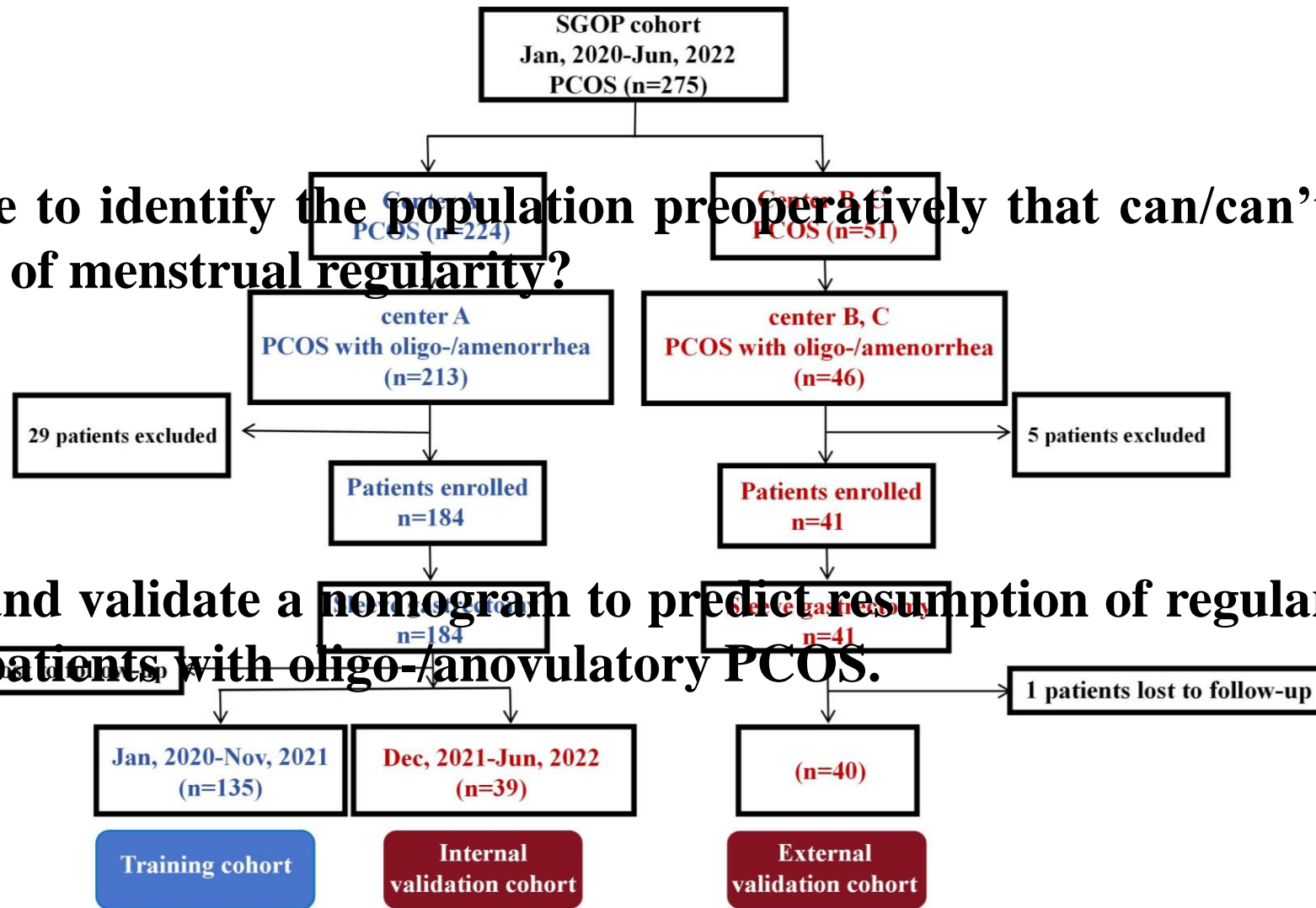
Univariate and Multivariate Logistic Regression Analyses

Variables	Univariate			Multivariate		
	OR	95%CI	P value	OR	95%CI	P value
Age, ≥33.5 vs <33.5, years	2.58	0.56-11.88	0.22			
BMI, ≥43.08 vs <43.08, kg/m2	1.40	0.58-3.37	0.45			
WHR, ≥0.89 vs <0.89	3.20	1.29-7.96	0.01	8.23	2.31-29.36	<0.01
Body lean ratio, ≥50.74 vs <50.74, %	1.70	0.72-4.05	0.23			
Body fat ratio, ≥42.19 vs <42.19, %	2.00	0.87-4.59	0.10			
Visceral fat ratio, ≥0.82 vs <0.82, %	1.88	0.82-4.30	0.14			
Nas, ≥4.5 vs <4.5	0.56	0.24-1.31	0.18			
PCOM,Yes vs No	0.32	0.07-1.45	0.14			
Testosterone, ≥1.27 vs <1.27, nmol/L	3.76	1.60-8.83	<0.01	4.20	1.41-12.54	0.01
AMH, ≥4.01 vs <4.01, ng/ml	1.43	0.63-3.27	0.39			
FSH, ≥5.73 vs <5.73, mIu/ml	0.70	0.31-1.61	0.40			
LH, ≥10.27 vs <10.27, mIu/ml	2.82	0.79-10.07	0.11			
LH/FSH, ≥1.78 vs <1.78	1.69	0.66-4.31	0.28			
PRL, ≥353.61 vs <353.61, μIU/ml	0.31	0.13-0.74	0.01	0.29	0.10-0.87	0.03

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Univariate and Multivariate Logistic Regression Analyses (Continued)

Variables	Univariate			Multivariate		
	OR	95%CI	*P* value	OR	95%CI	*P* value
FPG, ≥5.78 vs <5.78, mmol/L	1.35	0.56-3.25	0.51			
Fasting insulin, ≥23.33 vs <23.33, mIU/L	0.52	0.22-1.26	0.15			
HbA1c, ≥5.95 vs <5.95, %	0.52	0.23-1.20	0.13			
HOMA-IR, ≥5.95 vs <5.95	0.43	0.17-1.10	0.08	0.09	0.02-0.37	<0.01
AUC glucose,≥18.43 vs <18.43	1.47	0.64-3.38	0.36			
AUC insulin, ≥239 vs <239	3.26	0.92-11.61	0.07	6.54	1.35-31.72	0.02
HDL-C, ≥1.10 vs <1.10, mmol/L	0.53	0.23-1.23	0.14			
Non-HDL-C, ≥3.34 vs <3.34, mmol/L	3.13	1.35-7.30	0.01	4.64	1.56-13.77	0.01
NEFA, ≥48.5 vs <48.5, umol/dL	3.06	1.05-8.92	0.04			

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Accuracy of the Prediction Score of the Nomogram

Variables	Value (95%CI)		
	Training Cohort	Internal validation cohort	External validation cohort
Area under ROC curve,	0·85 (0·77-0·94)	0·86 (0·73-0·99)	0·83 (0·70-0·96)
Sensitivity, %	92·5 (87·4-97·5)	93·3 (84·4-100)	73·7 (53·9-93·5)
Specificity, %	69·0 (52·1-85·8)	66·7 (35·9-97·5)	85·7 (70·7-100)
Positive predictive value, %	91·6 (86·3-96·8)	90·3 (79·9-101)	82·4 (64·2-101)
Negative predictive value, %	71·4 (54·7-88·2)	75·0 (45·0-105)	78·3 (61·4-95·1)
Positive likelihood ratio	2·98 (1·73-5·14)	2·80 (1·11-7·09)	5·16 (1·75-15·2)
Negative likelihood ratio	0·11 (0·05-0·22)	0·10 (0·02-0·41)	0·31 (0·14-0·67)

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Fingdings & Highlights

- SG achieved significant resumption of regular menstruation in patients with oligo-/anovulatory PCOS

- A nomogram combining six preoperative factors was developed and validated to predict the resumption.

- Independent positive predictors included AUCinsulin, Non-HDL-C, WHR, and total testosterone

- HOMA-IR and PRL were negative predictors

Thanks for your attention !

Have a good day !

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