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CASE REPORT

The Successful Treatment of Pulmonary Embolism as a Complication after Uterine Fibroid Embolization (Case Report)

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Abstract: ***Background*:** Uterine fibroid embolization (UFE) is as an effective alternative to hysterectomy and myomectomy. However, UFE is associated with a wide spectrum of complications including in rare instances thromboembolic events and even pulmonary embolism (PE).

***Case Presentation*:** A case of a 36-year-old woman suffering from a symptomatic uterine fibroid is described as follows. The patient underwent UFE and overnight she suddenly collapsed with signs of massive PE. In consequence of cardiopulmonary resuscitation and urgent systemic thrombolytic therapy, cardiac activity was restored successfully.

***Discussion & Conclusion*:** This constitutes another report of PE developed following UFE. In the case described here PE occurred 26 hours after the procedure was performed. Before UFE all patients should undergo complete examination for exclusion of pre-existing venous deep thrombosis and coagulopathies.

Keywords: Uterine fibroid embolization, hysterectomy, uterine fibroid, complications, venous thromboembolism, pulmonary embolism.

1. INTRODUCTION

Uterine fibroid embolization (UFE) has already been in use for two decades as a popular treatment method for symptomatic uterine fibroids. Since the first report of successful attempts at UFE in 1995 by J.H. Ravina *et al.* [1], this minimally invasive procedure has grown in popularity [2]. At present UFE, also known as uterine artery embolization, is an effective alternative to hysterectomy and myomectomy.

Various complications have been described after UFE including rare, life-threatening conditions and even deaths. With the growing number of instances of this procedure performed worldwide, increased attention is being paid to the incidence, details and severity of complications such as venous thromboembolism (VTE) which includes deep vein thrombosis and pulmonary embolism (PE) [3]. While there are a limited number of studies concerning VTE in patients who have undergone UFE, reports available of PE following UFE in both clinical cases [4, 5] and in larger studies [6] provide a reasonable justification for an interest in different aspects of these complications.

We report here a case of PE developed following UFE.

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2. CASE PRESENTATION

A 36-year-old Caucasian woman (gravida 3, para 1) was admitted to the department of gynaecology on April 14, 2016 with a diagnosis of "symptomatic uterine fibroid" in order to perform UFE. On admission, she complained of nagging pains below her waist, hypermenorrhea, fatigue, and frequent urination. The uterine fibroid had been initially revealed one year earlier.

On examination, any abnormalities on the part of respiratory, circulatory and digestive systems were not detected, and the pulse rate was rhythmic at 78 bpm, the respiratory rate was normal. The pelvic examination was normal except for the presence of a palpable 3-4 cm mass in the right uterine wall. No other significant findings on the blood and urine analyses were revealed. An electrocardiogram (ECG) was characterized by a normal variant.

On pelvic ultrasound examination, a solitary well-defined solid mass, consistent in appearance of uterine fibroid was detected. The mass of 35 mm in size was located along the right lateral wall of the uterus.

Our patient underwent UFE at 11:00 a.m. on April 14, 2016. During a procedure under local anesthesia through the right transfemoral access, the catheterization of the left inner iliac artery was conducted with a catheter RUC 5F and of the left uterine artery superselectively. The pre-embolization

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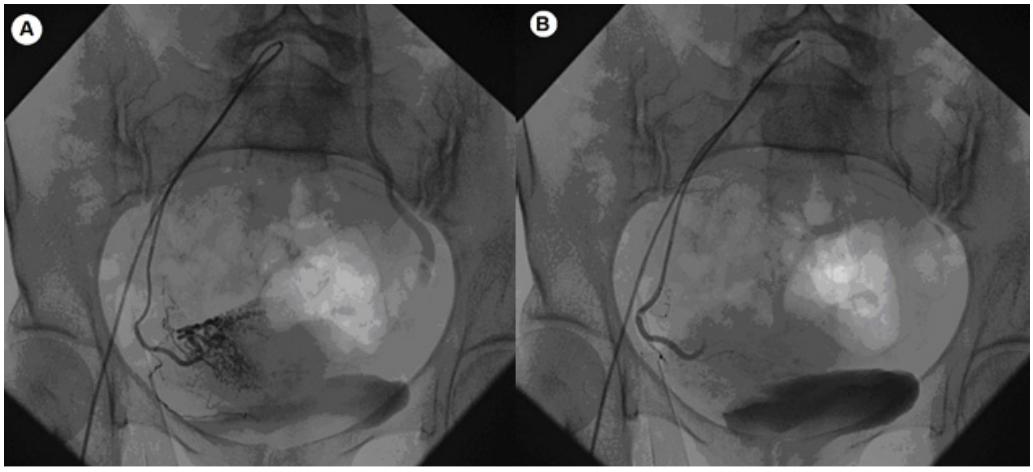

Fig. (1). Right uterine artery angiogram prior to (**A**) and after (**B**) embolization.

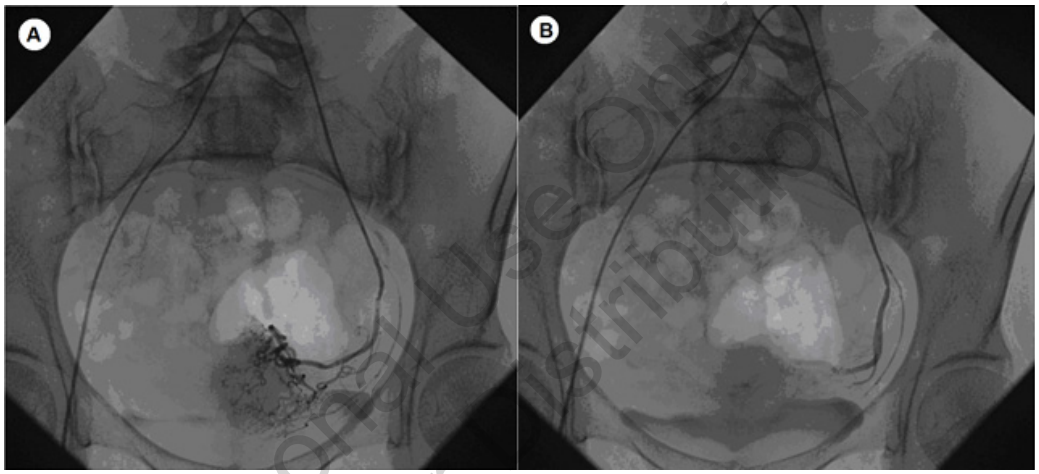

Fig. (2). Left uterine artery angiogram prior to (**A**) and after (**B**) embolization.

angio run is presented in Figs. (**1A** and **2A**). The left uterine artery was embolized with 500-700 µm polyvinyl alcohol particles through the catheter, under angiographic control until blood flow cessation was achieved in branches of the uterine artery. The embolization of the right uterine artery was performed analogously to this method. The control angiograms showed absence of blood flow in both uterine arteries (Figs. **1B**, **2B**).

During the postoperative period, the patient noted fatigue and drawing pains in the lower abdomen. The following day at 01:45 p.m. more than 26 hours after UFE while attempting to get out of bed her condition deteriorated sharply – she experienced a shortness of breath, severe retrosternal pain and dizziness. On examination just a few minutes later facial cyanosis and shallow breathing were reported; respiratory rate was 33 breaths per minute and blood pressure (BP) had dropped to 80/60 mm Hg, with a pulse rate of 98 per minute.

The patient was instantly transferred to the intensive therapy ward. Twenty minutes later following further deterioration at 02:05 p.m. the patient lost consciousness with severe cyanosis of the face and collar zone; the pulse, heart sounds and BP were not detectable. The monitor ECG recordings exhibited an asystole.

The instantaneous resuscitations included closed-chest cardiac massage, artificial lung ventilation through an endotracheal tube controlled by BP mandatory ventilation. Intermittent intravenous infusions of epinephrine and atropine were administered. Cardiac activity with the heart rate of 138 bpm was regained at 02:08 p.m.

However, at 02:10 p.m. asystole reoccurred and resuscitations were continued with closed-chest cardiac massage and intravenous administrations of epinephrine, atropine, dexamethasone (8 mg), and sodium bicarbonate 4.2% (400 ml). Cardiac activity was restored at 02:15 p.m., BP raised up to 75/45 mm Hg and 15 minutes later BP achieved 110/45-125/65 mm Hg. Her jugular veins were distended. Oxygen saturation of 78% was detected. The ECG records showed (Fig. **3**) atrial fibrillation with ventricular tachisystole (130-158 bpm), complete right bundle branch block. On echocardiography (02:30 p.m.) the following signs were revealed: both right ventricle pressure and volume overload, severe hypokinesis of the right ventricle free wall and the ventricular septum, enlarged right atrium and elevated pulmonary artery pressure (70 mm Hg).

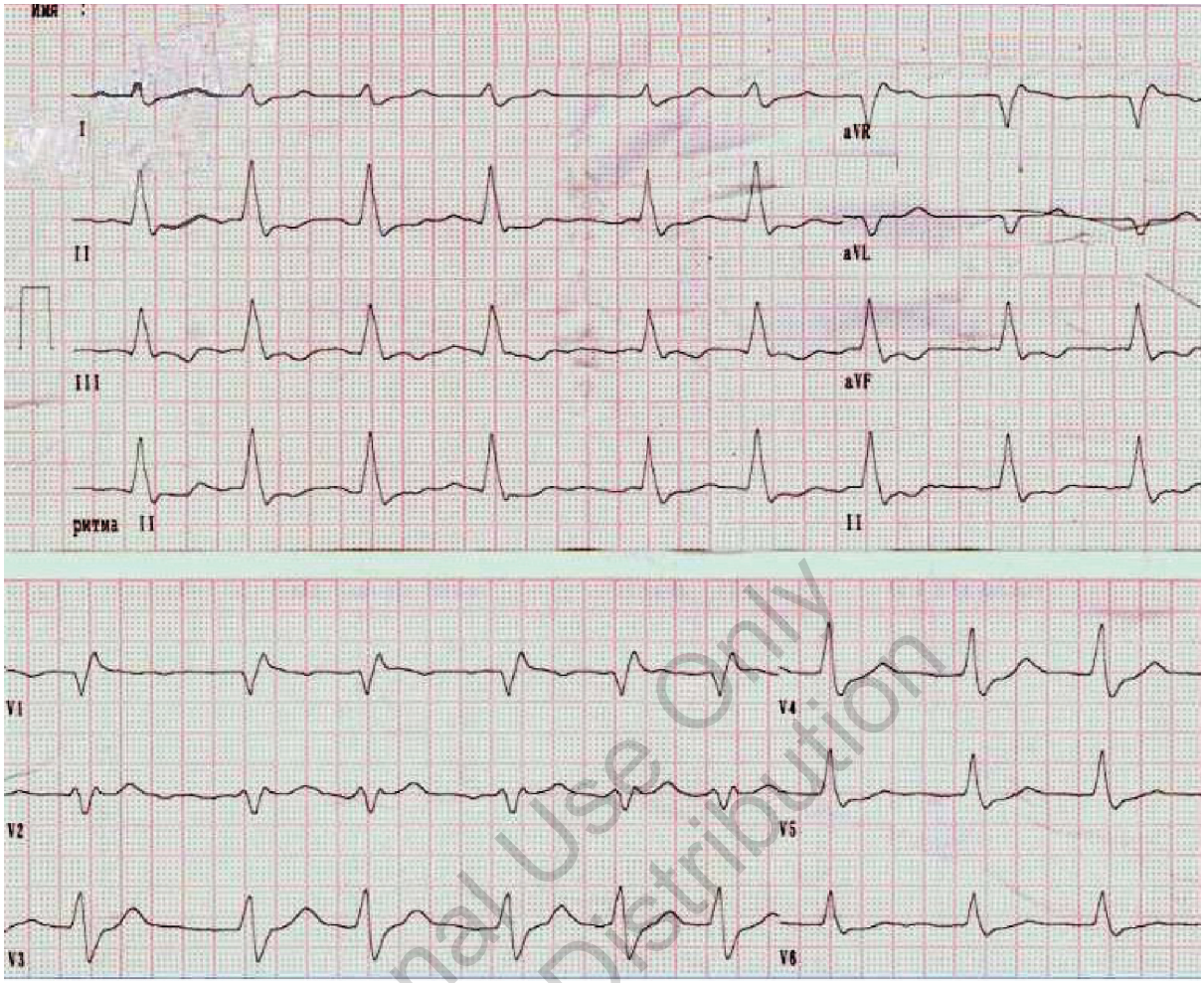

Fig. (3). The electrocardiogram at 02:25 p.m. after the patient was resuscitated (paper speed - 50 mm/sec).

The diagnosis of massive PE was established and consequently urgent systemic thrombolytic therapy was initiated. Directly after this at 02:35 p.m. systemic intravenous thrombolysis was begun with urokinase as follows: an initial dose (4400 IU x 70 kg) - 308000 IU for 10 minutes; a maintaining dose (4400 IU x 70 kg) 308000 IU per hour for a period of 12 hours (summary dose 3696000 IU). The course of urokinase was followed by intravenous heparin and then sequentially low molecular weight heparin (enoxaparin sodium) and the direct factor Xa inhibitor (rivaroxaban) were administrated.

On the next day at 03:00 p.m. almost 24 hours after systemic thrombolysis was initiated, the repeat echocardiogram revealed no dilation of the right atrium and ventricle, normal myocardial contractility, pulmonary artery pressure - 30 mm Hg. The ECG showed sinus rhythm, heart rate 100 bpm, T wave inversion in V_1-V_4, flattened T waves in V_5-V_6, no signs of right bundle branch block (Fig. **4**).

The patient remained in the hospital for 7 days and continued to receive rivaroxaban (30 mg per day). During the week following the PE episode she demonstrated mild signs of hypoxic–ischemic encephalopathy (somnolence, dizziness, verbal contact retardation) which disappeared within the week. She was discharged from our hospital on 24 April 2016 in a satisfactory condition.

3. DISCUSSION

There is a growing body of evidence which strongly suggests that leiomyoma embolization is a safe procedure [7]. However, as with any invasive procedure, UFE is associated with certain minor and major complications [8, 9]. Overall, major complications typically occur in 3.5-4% of patients and minor complications in 13.2-23% [7, 8]. Adverse events developed in the acute phase are usually associated with vascular access procedures, thromboembolic, infectious complications, and anesthesia care [8].

PE is a severe and potentially fatal complication of UFE. Incidence of PE after UFE has been estimated to be 1 in 200-400 procedures [6, 10]. To date, there is only a single study concerning incidence of VTE after UFE in 1200 consecutive patients [6]. Authors reported 8 (0.67%) cases of VTE including 4 (0.3%) where patients presented with symptoms suggestive of PE.

Development of PE is thought to relate to transient impaired coagulation in this procedure [5, 9, 11]. B. Nicolic *et al*. revealed a transient hypercoagulable state induced by the UFE procedure in 27 patients by measurement of several surrogate markers of hypercoagulability [12]. They concluded that UFE procedure generally causes mild to moderate hypercoagulability when compared with the preembolization

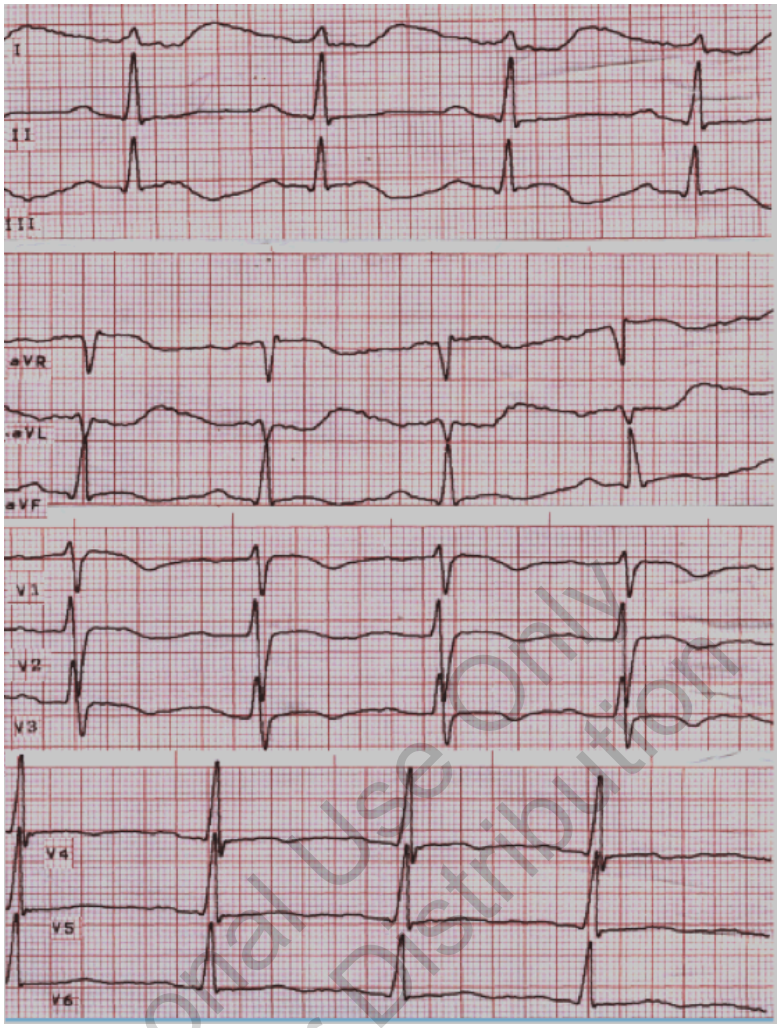

Fig. (4). The electrocardiogram of the patient at 04:00 p.m. recorded almost 25 hours after beginning of systemic thrombolysis (paper speed - 50 mm/sec).

state. Although in comparison with the much more dramatic procoagulable state associated with surgical procedures, the risk of thrombosis after UFE is still lower. Of specific interest clotting after UFE is related to intravascular injection of various microparticles capable of inducing prothrombotic processes [12].

Additionally, the period of immobility required after UFE, venous compression by an enlarged fibroid uterus in several cases and underlying pro-coagulation and prothrombotic disorders may predispose to this complication [8].

Therefore, PE is an infrequent but life-threatening complication after UFE. Obviously, all candidates for UFE treatment should undergo complete examination for exclusion of pre-existing venous deep thrombosis and coagulopathies. After completion of the procedure it is important to keep in mind probability of thromboembolic event development [6].

We accept an opinion of colleagues [4] that all patients should be followed up closely after the procedure for any symptoms related to VTE. Duration of the follow-up is not yet determined, but it is important to define a period of time when thromboembolic events are possible to occur. Our case demonstrates clearly that PE developed over 26 hours after UFE was performed.

There is no consistent approach regarding prevention of thromboembolic events after this procedure. H. Hamoda *et al.* advocate that patients undergoing UFE should routinely receive thromboprophylaxis in the form of thromboembolic-deterrent stockings [5]. F. Czeyda-Pommersheim *et al*. recommend using of pneumatic compression devices on every patient undergoing UFE [6].

Concerning pharmacologic prevention of thromboembolic complications, there is no evidence that heparin-like agents use would be of benefit [5]. Moreover, given the rarity of thrombosis after UFE F. Czeyda-Pommersheim *et al*. consider that the risk of prophylactic anticoagulants might exceed the benefits [6]. Obviously, more research must be performed regarding the link between UFE and VTE including PE [4].

While there are no specific recommendations for the prophylaxis of thromboembolic episodes after UFE, it seems to be reasonable to follow the guidelines on the prevention of VTE produced by the American College of Chest Physicians (8^{th} and 9^{th} Edition) [13, 14].

CONCLUSION

This is another report of PE developed after UFE. PE occurred 26 hours after the procedure was performed. Before UFE all patients should undergo complete examination for exclusion of pre-existing venous deep thrombosis and coagulopathies. Despite relatively rare cases of VTE, including PE, further investigations are needed to study the characteristics of this complication after UFE and to develop an effective preventive program.

LIST OF ABBREVIATIONS

BP	=	Blood Pressure
ECG	=	Electrocardiogram
PE	=	Pulmonary Embolism
UFE	=	Uterine Fibroid Embolization
VTE	=	Venous Thromboembolism

AUTHORS' CONTRIBUTIONS

Nikolay T. Vatutin: a general idea creation, author cooperation, final editing; Gennadiy G. Taradin: general supervision and of the article proceeding, review of literature; Ganna S. Smyrnova: article writing, clinical characteristics; Valery B. Kostogryz: management of the patient, treatment details; Vadim S. Kolesnikov: writing of medical resuscitation procedures; Andrey V. Dmitriev: performance and description of uterine fibroid embolization, angiogram pictures storing and processing.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The case report was approved by the Ethics in Research Committee of the Donetsk National Medical University named after M. Gorky (approval number – 380.215 at July 12th, 2017).

HUMAN AND ANIMAL RIGHTS

No animals were used for studies that are basis of this research. The case report was performed on woman in accordance with the ethical standards of the committee responsible for human experimentation (institutional and national), and with the Helsinki Declaration of 1964, as revised in 2013 (https://www.wma.net/policies-post/wma-declaration-of-helsinki-ethical-principles-for-medical-research-involving-human-subjects/).

CONSENT FOR PUBLICATION

Written and informed consent has been obtained from all the patient.

CONFLICT OF INTEREST

The authors declare that the article presented did not receive research grants from funding agencies, financial support for scientific or clinical meetings, educational and promotional programs. The authors including their relatives are not members of advisory, private, commercial, pharmaceutical or other boards. All authors declare that they have no conflicts of interest.

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REFERENCES

[1] Ravina JH, Bouret JM, Fried D, *et al*. Value of preoperative embolization of uterine fibroma: Report of a multicenter series of 31 cases. Contracept Fertil Sex 1995; 23: 45-9.

[2] Goodwin SC, Spies JB, Worthington-Kirsch R, *et al*. Uterine artery embolization for treatment of leiomyomata: Long-term outcomes from the FIBROID Registry. Obstet Gynecol 2008; 111: 22-33.

[3] Di Nisio M, van Es N, Büller HR. Deep vein thrombosis and pulmonary embolism. Lancet 2016; 388(10063): 3060-73.

[4] Baig A, Mukherji R. Pulmonary embolism after uterine fibroid embolization: Case report. Cardiovasc Intervent Radiol 2011; 34: 1113-4.

[5] Hamoda H, Tait P, Edmonds DK. Fatal pulmonary embolus after uterine artery fibroid embolisation. Cardiovasc Intervent Radiol 2009; 32: 1080-2.

[6] Czeyda-Pommersheim F, Magee ST, Cooper C, Hahn WY, Spies JB. Venous thromboembolism after uterine fibroid embolization. Cardiovasc Intervent Radiol 2006; 29(6): 1136-40.

[7] Tropeano G, Amoroso S, Di Stasi C, *et al*. Incidence and predictive factors for complications after uterine leiomyoma embolization. Hum Reprod 2014; 29(9): 1918-24.

[8] Schirf BE, Vogelzang RL, Chrisman HB. Complications of uterine fibroid embolization. Semin Intervent Radiol 2006; 23: 143-9.

[9] Memtsa M, Homer H. Complications associated with uterine artery embolisation for fibroids. Obstet Gynecol Int 2012; 2012: 290542.

[10] Spies JB, Ascher SA, Roth AR, Kim J, Levy EB, Gomez-Jorge J. Uterine artery embolization for leiomyomata. Obstet Gynecol 2001; 98: 29-34.

[11] Freed MM, Spies JB. Uterine artery embolization for fibroids: a review of current outcomes. Semin Reprod Med 2010; 28(3): 235-41.

[12] Nikolic B, Kessler CM, Jacobs HM, *et al*. Changes in blood coagulation markers associated with uterine artery embolization for leiomyomata. J Vasc Interv Radiol 2003; 14: 1147-53.

[13] Geerts WH, Bergqvist D, Pineo GF, *et al*. Prevention of venous thromboembolism: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines (8th Edition). Chest 2008; 133(6 Suppl): 381S-453S.

[14] Gould MK, Garcia DA, Wren SM, *et al*. Prevention of VTE in non-orthopedic surgical patients: Antithrombotic Therapy and Prevention of Thrombosis, 9th ed: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines. Chest 2012; 141(2 Suppl): e227S-e277S.