

The specificities of eastern Serbia STEMI network organization during 2020 COVID year

Aleksandar Jolić¹, Vladimir Mitov¹, Dragana Adamović¹, Marko Dimitrijević¹, Milan Nikolić¹, Milan A. Nedeljković²

¹Invasive cardiology department Zajecar Health Center, ²Cardiology Clinic, University, Clinical Center of Serbia; Medical faculty, University of Belgrade

Abstract

Background. The aim of the study was to show the organization of eastern Serbia STEMI network during the 2020.

Methods. We analyzed and compared the results of work of the Cath Lab in 2019 to 2020. Due to the working conditions in COVID-19 pandemic measures, we have also adapted the work in our invasive cardiology department in Zajecar accordingly. The patients with acute coronary syndrome (ACS) were diagnosed in regional hospitals of Eastern Serbia - Bor and Zajecar. Here, the initial triage was done, and the patients divided into COVID-19 negative and positive groups. The invasive cardiology department of Zajecar hospital formed three teams for management of these patients, and all of them consisted of invasive cardiology specialists, 2 medical technicians and one radiology technician.

Results. The number of coronarographies was 561 in 2019. and 494 in 2020. The number of PCI procedures was 372 or 66% in 2019. and 297 or 60% of all procedures in 2020. Also, the number of stents was analyzed, so there were 395 used or 1 per procedure in 2019. and 409 or 1.3 per procedure in 2020. Elective procedures were 170 (45,70%) in 2019. and 108 (36,36%) in 2020. ACS patients comprised a number of 202 (54,30%) in 2019. and 189 (63,64%) in 2020. In 2019, the patients were admitted to hospital on average 222 min after the pain onset (time to first medical contact), transport to our facility lasted on average 81 min, and door to balloon time was 36 min. In 2020 time to first medical contact was 302 min, transport to our facility was 76 min, and door to balloon time was 26 min.

Conclusions. In our department we have organized a 24/7 roll call for the management of the patients with ACS. Fast adaptation and reorganization of our work in accordance with the new circumstances and epidemiologic reality enable us to keep the same level of service for these patients in 2020 COVID-19 year. The specificity of 2020 was that there was a 10% fall in number of treated patients, along with significant prolongation of the time from pain onset to the first medical contact.

Key words coronarography, percutaneous coronary intervention, COVID-19

Introduction

The invasive cardiology department of Zajecar Health center was formed in 2014. As part of regional network of cath labs all over Serbia. Our department treats all the patients with coronary artery disease from Eastern Serbia area, which encompasses two counties, Zajecar and Bor with 4 municipalities each.¹ As a part of STEMI (ST Elevation Myocardial Infarction) network of Republic of Serbia, from 2016 onwards, invasive cardiology department of Zajecar hospital is treating all the patients with acute coronary syndrome (ACS) from Eastern Serbia area, 24/7, 365 days². However, with COVID-19 emerging in Serbia, from March of 2020. a pandemic situation is proclaimed, making the whole health system change its organization, which also affected invasive treatment of patients with ACS. In the opening months of the pandemic, a recommendation was issued to treat the COVID-19 STEMI patients with fibrinolysis, even in PCI capable centers,

and all in order to minimize contact of COVID-19 patient and medical staff and in doing so minimize the possibility of spreading the infection. But soon, this system showed its weakness, so new recommendation emerges to treat COVID-19 patients with ACS in the same way as non-COVID-19 patients. This meant fast reorganization and adaptation of invasive cardiology department of Zajecar hospital in order to ensure functionality with minimal epidemiological risk to the other patients and staff during the treatment of ACS patients from eastern Serbia area, weather being COVID-19 positive or not.

Methods

We analyzed and compared results from 2019 to 2020. Due to work conditions during the pandemic year which involved anti pandemic measures, also meant adapting the work of invasive cardiology department of Zajecar hospital. All the elective program was discontinued in order to prevent further contact of patients with staff and

among themselves and thus prevent spreading the COVID-19 infection. The ACS patients were treated and initially diagnosed in regional hospitals of Eastern Serbia, or Bor and Zajecar counties. At the moment of first contact and STEMI or NSTEMI diagnosis, fast COVID test was also done. Based on this all the patients were divided into COVID-19 positives and negatives. After an optimal medical therapy in accordance to guidelines was given, these patients were transported to our facility. The transport was organized according to the COVID-19 positive or negative division, meaning that all the anti-pandemic measures were taken with the patients. The patients were accompanied by the medical team which consisted of a doctor, medical technician, and a driver, in case of COVID-19 positive patients measures of staff protection were taken as in the "red" zones. In 2020 invasive cardiology department of Zajecar hospital had three trained doctors, specialized and capable of independent work, two doctors were on their residency, and 6 medical technicians trained for cath lab work. Radiology technicians were assigned on a daily basis from our radiology department to the cath lab. Three teams were formed consisting of one invasive cardiology specialist, 2 medical technicians and one radiology technician. Those teams were kept from contacting each other. All the patients were sent to the Cath lab after initial assessment, where the procedures were done. As mentioned before, during the work with COVID-19 positive patients, all the protective measures as in the "red" zones were used. After the procedure, COVID-19 negative patients were placed for further care in the regular ICU, and after initial recovery sent to their origin hospitals, while COVID-19 positive patients were placed in a provisional isolation unit on our cardiology ward, where they were monitored for 24-48 hours. If there was no complications, they were transferred to infectiology ward of Zajecar Health center for further follow up and recovery from COVID-19. This flow pattern enabled us to keep unobstructed STEMI network of Eastern Serbia with minimal risk of spreading the infection to patients and staff.

Our department is using a Siemens Axiom Artis X-ray machine for coronary procedures. The procedures were done with right side radial or femoral arterial puncture. An introducer sheath of 6 F and 11cm with dilatator and hemostatic valve was used. For left coronary artery cannulation we used diagnostic catheters TIG II 3.5, JL 3.5 and 4, as well as JR 3.5 and 4 for right coronary artery cannulation. Also guiding catheters were used, EBU 3.5, 3.75, JL 3.5 and 4, JR 3.5 and 4, HS. The visualization of left anterior descending artery (LAD) was done in RAO cranial or PA cranial position of the detector. The circumflex artery was visualized in PA cranial and RAO caudal positions. Visualization of the right coronary artery was done in LAO or PA cranial positions.

Results

The number of coronary angiographies was 561 in 2019. And 494 in 2020. PCI procedures were 372 or 66% in 2019, and 297 or 60% of all in 2020. Number of stents was 395 or 1 per procedure in 2019. And 409 or 1.3 per procedure in 2020 (Table 1).

We analyzed a ratio of elective to urgent procedures, and there was 170 (45.70%) in 2019, 108 (36.36%) in 2020. ACS procedures were 202 (54.30%) in 2019 and 189 (63.64%) in 2020 (Table 1). Average procedure duration was 12.4 minutes in 2020, and 10.4 minutes in 2020. Average exposure time was 4.1 minutes in 2019, and 3.5 minutes in 2020.

Also, elective vs primary PCI distribution was analyzed in 2020 divided by months. January had a total of 26 PCI, out of which 17 (65,38%) were pPCI in ACS, February 29 and 21 (72,41%) respectively, March 21 and 15 (71.42%), April 11 and all were pPCI, May 22 and 19 (86.36%), June 21 and 13 (61.90%), July 31 and 17 (54.83%), September 36 and 19 (55.55%), October 36 and 19 (52.77%), November 23 and 16 (69.56%), and December 16 and 11 (68.75%) (Figure 1).

In 2019, patients were admitted to hospital on average 222 minutes following pain onset (time to first medical contact), transport to our facility lasted on average 81 minutes, and door to balloon time was 36 minutes. In 2020, time from symptom onset to first medical contact was 302 minutes, transport to our facility took on average 76 minutes, and door to balloon time was 26 minutes.

Table 1. Analysis of procedure number, stents, elective and ACS patients, procedure duration and exposure times in 2019 and 2020.

	2019	2020
Coronary angiography	561	494
PCI	372 (66%)	297 (60%)
Stents	395	409
ACS patients	202 (54,30%)	189 (63,64%)
Elective patients	170 (45,70%)	108 (36,36%)
Procedure duration (min)	12,39	10,45
RTG exposure time (min)	4,06	3,47

Table 2. Time intervals from pain onset to first medical contact (FMC), then to ICU admittance, door to balloon time, in 2019 and 2020.

	Pain-FMC (min)	FMC-ICU (min)	ICU-Balloon (min)
2019.	222	81	36
2020.	302	76	26

Discussion

Invasive cardiology department in Zajecar is experiencing a constant increase in patient number from eastern Serbia (2). Diagnostic coronary angiography was done in 561 patients in 2019 and 494 in 2020. Out of this number, 66% were treated with PCI and stent implantation in 2019 and 60% in 2020. These results are in line with those in Europe and Great Britain, where out of 3300 diagnostic angiographies per million inhabitants, 1500 were PCI procedures (3,4). In 2020, COVID-19 year, total number of patients decreased by 10% in comparison to 2019. Due to specific system organization in this period, number of elective procedures decreased by 10%, while the same increase was noted for ACS patients.

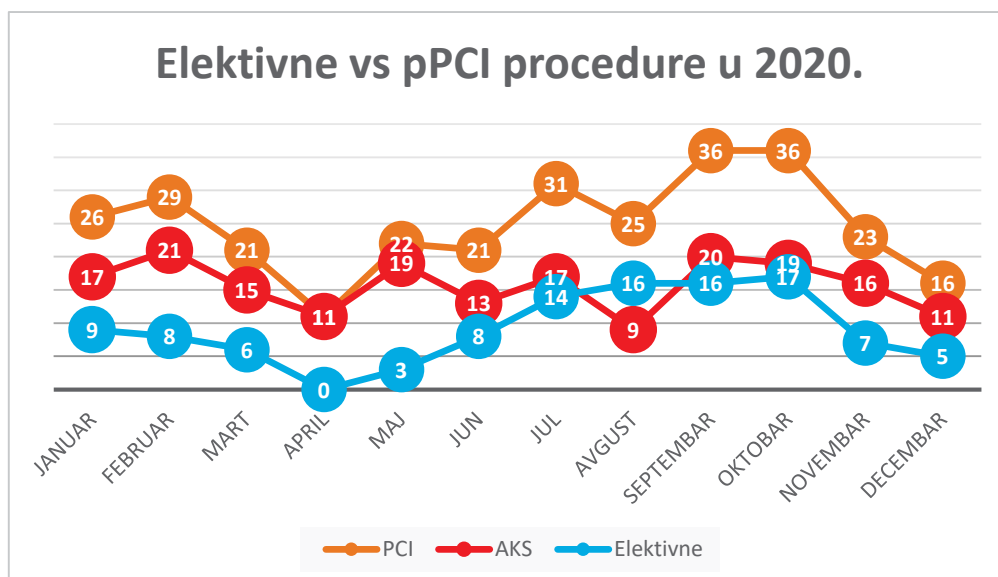


Figure 1. Monthly distribution of elective or pPCI patients in 2020.

Monthly distribution analysis showed that elective program was shrunk in the first half of the year, and ground to a halt in April, when only ACS patients were treated. In second half of 2020. The number of elective patients equaled the number of ACS patients. Due to epidemiological tendencies in Serbia, a second peak of COVID-19 came in December, when we had another drastic decrease of elective patient numbers, but the 24/7 principle is maintained for ACS. Peaks of COVID-19 were characterized by complete halt or drastic reduction in elective program, while all the staff of invasive cardiology was divided into three teams which consisted of invasive cardiologist, two angio technicians, and a radiology technician. Only one team had contact with the patient in order to reduce the risk from infection and thus maintain continuity in cath lab work and ACS patient treatment during the whole of 2020. Because the management of our hospital recognized the importance of keeping alive the STEMI network, invasive cardiology department along with internal diseases ward were excluded from COVID-19 system. Part of our capacities was dedicated to temporary isolation units for patients with ACS treated with PCI, and for elective ones. Separate patient flows were formed for COVID-19 positive and negative patients, of course cardiology treatment was the same, with only difference being in the isolation part. Other centers experiences showed the need for system adaptation according to the epidemiological situation while also keeping the principle of PCI as basis for STEMI, and high risk NSTEMI patients treatment (5,6). The other specificity of 2020 was the change in time intervals, from pain onset to FMC, from FMC to transport to PCI capable facility, and finally in door to balloon time. Analyzing these times established a time from pain onset to FMC as a problem. In 2019 this time was on average 222 minutes, which is in itself long, and all efforts should be made in shortening it by health education and work among people. However, in 2020 fear of physical contact with other people, especially in health care facilities, prolonged this period all the way to 302 minutes. On the other hand, average transport

time got shorter from 81 min in 2019 to 76 in 2020, also door to balloon time shrunk from average of 36 minutes in 2019 to 26 minutes in 2020. The average duration of the procedure itself shrunk from 12,39 minutes in 2019 to 10.45 minutes in 2020. Exposure time also shortened from 4.06 to 3.07 minutes. However, this did not affect the quality of the work, which is represented in number of implanted stents was the same regardless of the procedure number being smaller.

Conclusions

Invasive cardiology department in Zajecar is organized on 24/7 basis for ACS patient treatment. Quick adaptation and reorganization of work in accordance with epidemiological situation, the same principles were met in 2020. Which ment keeping the continuity of ACS patient treatment in whole of eastern Serbia. The specificity of 2020 was reduction in number of treated patients by 10%, with drastic prolongation of time interval from symptom onset to FMC.

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Sažetak

Aleksandar Jolić¹, Vladimir Mitov¹, Dragana Adamović¹, Marko Dimitrijević¹, Milan Nikolić¹, Milan A. Nedeljković²

¹Odeljenje invazivne kardiologije, Zdravstveni centar Zaječar, ²Klinika za kardiologiju, Univerzitetski Klinički centar Srbije; Medicinski fakultet, Univerzitet u Beogradu

Uvod. Cilj studije je bio da se prikaže organizacija i rad STEMI mreže istočne Srbije tokom 2020. godine i COVID-19 pandemije.

Metode. Analizirali smo i uporedili rezultate rada Sale za kateterizaciju u 2019. i 2020. godini. Zbog uslova rada u merama pandemije COVID-19, shodno tome smo prilagodili i rad na našem odeljenju invazivne kardiologije u Zaječaru. Pacijentima sa akutnim koronarnim sindromom (AKS) dijagnostikovani su u regionalnim bolnicama istočne Srbije - Bor i Zaječar. Ovde je urađena inicijalna trijaža, a pacijenti su podeljeni na COVID-19 negativne i pozitivne grupe. Odeljenje invazivne kardiologije zaječarske bolnice formiralo je tri tima za zbrinjavanje ovih pacijenata, a sve su činili specijalisti invazivne kardiologije, 2 medicinska tehničara i jedan radiološki tehničar.

Rezultati. Broj koronarografija bio je 561 u 2019. i 494 u 2020. Broj PCI procedura je bio 372 ili 66% u 2019. i 297 ili 60% svih zahvata u 2020. Takođe, analiziran je i broj stentova, tako da je bilo 395 korišćenih ili 1 po zahvatu u 2019. i 409 ili 1,3 po zahvatu u 2020. Izborni zahvati bili su 170 (45,70%) u 2019. i 108 (36,36%) u 2020. Pacijenti sa AKS su činili broj od 202 (54,30%) u 2019. i 189 (63,64%) u 2020. godini. Pacijenti su u 2019. godini primani u bolnicu u proseku 222 min nakon pojave bola (vreme do prvog lekarskog kontakta), transport do naše ustanove je trajao prosečno 81 min, a vreme od vrata do balona 36 min. U 2020. godini vreme do prvog medicinskog kontakta bilo je 302 min, transport do naše ustanove je bio 76 min, a vreme od vrata do balona 26 min.

Zaključak. U našem odeljenju smo organizovali 24/7 rad za zbrinjavanje pacijenata sa AKS. Brza adaptacija i reorganizacija našeg rada u skladu sa novonastalim okolnostima i epidemiološkom realnošću omogućila nam je da zadržimo isti nivo usluge za ove pacijente i u 2020. COVID-19 godini. Specifičnost 2020. godine je da je došlo do pada broja lečenih pacijenata za 10%, uz značajno produženje vremena od pojave bola do prvog medicinskog kontakta.

Ključne reči: koronarografija, perkutana koronarna intervencija, COVID-19