COMPARISION OF STRATEGY – LESS INTUBATION AND LESS SURFACTANT – IN TWO DIFFERENT PERIODS AMONG PREMATURE INFANTS FROM 28 TO 36 WEEKS OF GESTATION

V. Milas 1,2, H. Dobrić 1,2, G. Lukić 1,2, K. Milas 1,2, M. Šapina1,2

1 Neonatology intensive care unit, Clinical hospital Osijek

2 Medical faculty of Josip Juraj Strossmayer University Osijek

**Introduction**

147 ventilated preterm infants of 28 or more weeks of gestation were investigated during two periods of time. They differed in the treatment approach - in the first, preterm infants were more often treated with conventional invasive mechanical ventilation and with surfactant delivered by nasotracheal tube (after intubation) and in the second with non-invasive ventilation and without intubation, or with surfactant delivered by the LISA method. We wondered if there was a difference in the perinatal outcome of these .

**Methods**

Preterm infants were devided in two groups: first group consists of newborns up to 32 weeks of gestation and the second of older premature infants. These preterm infants were investigated retrospectively in two periods, in 2015 and in 2017. Preterm infants less than 28 weeks and those with congenital anomalies were excluded. Four group of children have been formed: 1. preterms who were classically intubated and invasivelly ventilated and in whom surfactant has been performed classically, 2. those who have not been intubated and whom sufractant has not been given, 3. non intubated preterm infants whom surfactant has been given by LISA method and 4. preterm infants who have ben intubated and ventilated without surfactant.

Perinatal outcome was evaluated for the presence of complications - severe cerebra l bleeding or leukomalatia, necrotic enterocolitis and the presence of retinopathy of praematurity (need for laser photocoagulation). Differences in the duration of oxygenation and hospitalization during the 2 observed periods were pointed out. Results are showed in tables, in apsolute numbers and

percentages and statistical difference was pointed out by χ2 test , level of significance 0.05. Duration of hospitalization and oxygen threatment has been showed as averige values and median.

**Results**

67 preterm infants in 2015 and 80 in 2017 were treated.

Table 1 **Gestation alter of the preterm infants and the number of them with complications in two opserved periods**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Weeks of gestation** | | | | | | |
|  | **28 - 32** | | **> 32 < 37** | | **Preterm infants with complications** | | **Total** |
| **year** | **N** | **%** | **N** | **%** | **N** | **%** | **N** |
| **2015** | **27** | **40,3** | **40** | **59,7** | **19** | **28,4** | **67** |
| **2017** | **44** | **55,0** | **36** | **45,0** | **17** | **21,3** | **80** |
| **total** | **71** | **48,3** | **76** | **51,7** | **36** | **24,5** | **147** |

2017 proportion of preterm infants with complication was lower, chi-square= 22.54, p< p<0.05. We saw in 2015 year 17 preterm infants from 28 to 32 weeks of gestation with severe complications , and the equal number in 2017 among the same group. χ2= 1.84 and p>0.05.

Table 2  **Complications in preterm infants in 2015 and 2017**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **2015** | | | |  | **2017** | | | |
|  |  | **Weeks of gestation** | | | | | | | | |
|  |  | **28 - 32** | | **> 32 < 37** | |  | **28 - 32** | | **> 32 < 37** | |
| **Complications** | | **N** | **%** | **N** | **%** |  | **N** | **%** | **N** | **%** |
| **Cerebrel haemorrhagia** | |  |  |  |  |  |  |  |  |  |
|  | **without** | **9** | **33,3** | **23** | **57,5** |  | **18** | **40,9** | **23** | **63,9** |
|  | **mild** | **13** | **48,1** | **12** | **30,0** |  | **21** | **47,7** | **12** | **33,3** |
|  | **severe and leukomalatia** | **5** | **18,5** | **5** | **12,5** |  | **5** | **11,4** | **1** | **2,8** |
|  | **total** | **27** |  | **40** |  |  | **44** |  | **36** |  |
| **Necrotic enterocolitis** | |  |  |  |  |  |  |  |  |  |
|  | **no** | **22** | **81,5** | **37** | **92,5** |  | **37** | **84,1** | **35** | **97,2** |
|  | **yes** | **5** | **18,5** | **3** | **7,5** |  | **7** | **15,9** | **1** | **2,8** |
|  | **total** | **27** |  | **40** |  |  | **44** |  | **36** |  |
| **Retinopathy of praematurity** | |  |  |  |  |  |  |  |  |  |
|  | **no** | **16** | **59,3** | **36** | **97,3** |  | **31** | **70,5** | **35** | **97,2** |
|  | **yes** | **4** | **14,8** | **1** | **2,7** |  | **5** | **11,4** | **1** | **2,8** |
|  | **laser** | **7** | **25,9** | **0** | **0,0** |  | **8** | **18,2** |  | **0,0** |
|  | **total** | **27** |  | **37** |  |  | **44** |  | **36** |  |
| **Hospital infection** | |  |  |  |  |  |  |  |  |  |
|  | **no** | **20** | **74,1** | **35** | **94,6** |  | **40** | **90,9** | **35** | **97,2** |
|  | **yes** | **7** | **25,9** | **2** | **5,4** |  | **4** | **9,1** | **1** | **2,8** |
|  | **total** | **27** |  | **37** |  |  | **44** |  | **36** |  |
| **Total** |  | **42** |  | **23** |  |  | **42** |  | **16** |  |

In the year 2017, 3 preterm infants with 30 to 32 weeks of gestation undergo laser photocoagulation, and in the year 2015 nobody. We saw statistically different frequency of hospital infection (lower int he year 2017) in two observed periods. χ2= 50.298, p<0.05.

Table 3 **Intubation and administration of surfactant in preterm infants in 2015 and 2017**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  | **Intubation** | | | |
|  |  |  | **Yes** | | **No** | |
|  |  |  | **N** | **%** | **N** | **%** |
| **Surfactant** | |  |  |  |  |  |
| **Yes** | **2015** | **28-32** | **21** | **53,8** | **2** | **33,3** |
| **32 1/7-36 6/7** | **18** | **46,2** | **4** | **66,7** |
| **total** | **39** |  | **6** |  |
|  |  |  |  |  |  |
| **2017** | **28-32** | **24** | **80,0** | **5** | **50,0** |
| **32 1/7-36 6/7** | **6** | **20,0** | **5** | **50,0** |
| **total** | **30** |  | **10** |  |
| **No** | **2015** | **28-32** |  |  | **7** | **36,8** |
| **32 1/7-36 6/7** | **3** | **100,0** | **12** | **63,2** |
| **total** | **3** |  | **19** |  |
|  |  |  |  |  |  |
| **2017** | **28-32** |  |  | **15** | **37,5** |
| **32 1/7-36 6/7** | |  | **25** | **62,5** |
| **total** |  |  | **40** |  |

There was a significant difference (p <0.05) in the treatment in two periods. In 2015 - 28% was treated without surfactant and was not intubated compared to 2017 when 50% was not intubated and not received surfactant . There was statistically important difference between the number of preterm infants who has been treated without surfactant and without intubation in the year 2017. Chi-square= 6.78, p<0.05. Among preterm infants up to 32 weeks of gestation there were not significant difference between the frequency of intubation and performance of surfactant in two years. χ2=0.789 p<0.05.

Table 4 **Complications among preterm infants who were not intubated and in whom surfactant was not performed**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | **Complication** | | | | |
|  |  | **Yes** | | **No** | |  |
| **Year** |  | **N** | **%** | **No** | **%** | **N of infants** |
| **2015** | **28-32** | **1** | **14,3** | **6,0** | **85,7** | **7** |
| **>32<37** | **2** | **16,7** | **10,0** | **83,3** | **12** |
| **total** | **3** | **15,8** | **16,0** | **84,2** | **19** |
| **2017** | **28-32** | **4** | **26,7** | **11,0** | **73,3** | **15** |
| **>32<37** | **1** | **4,0** | **24,0** | **96,0** | **25** |
| **total** | **5** | **12,5** | **35,0** | **87,5** | **40** |
| **total** |  | **8** |  | **51** |  | **59** |

Among preterm infants who were not intubated and in whom surfactant is not performed we saw significant lowering of complication in the year 2017. χ2 =25.289 p<0.05.

Table 5 **Complications among preterm infants who were intubated and in whom surfactant was performed**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  | **Complication** | | | | |
|  |  | **Yes** | | **No** | |  |
| **Year** |  | **N** | **%** | **No** | **%** | **N of infants** |
| **2015** | **28-32** | **10** | **47,6** | **11** | **52,4** | **21** |
| **>32<37** | **2** | **11,1** | **16** | **88,9** | **18** |
| **total** | **12** | **30,8** | **27** | **69,2** | **39** |
| **2017** | **28-32** | **10** | **41,7** | **14** | **58,3** | **24** |
| **>32<37** | **1** | **16,7** | **5** | **83,3** | **6** |
| **total** | **11** | **36,7** | **19** | **63,3** | **30** |
| **total** |  | **23** |  | **46** |  | **79** |

Difference between the number of complications in the group of preterm infants who were intubated, intenively ventilated and with performed surfactant (yes/yes ) in two different periods was not statistically important. χ2= 1.161 p>0.05.

Table 6 **Frequency of complications in preterm infants connected with performance of surfactant in two years**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  | **Surfactant** | | | | |
|  |  |  | **Yes** | | **No** | | **Total** |
| **Year** | **Complications** | | **N** | **%** | **No** | **%** | **N** |
| **2015** | **without** | **28-32** | **12** | **66,7** | **6** | **33,3** | **18** |
|  | **>32<37** | **19** | **63,3** | **11** | **36,7** | **30** |
|  | **total** | **31** | **64,6** | **17** | **35,4** | **48** |
| **with** | **28-32** | **11** | **91,7** | **1** | **8,3** | **12** |
|  | **>32<37** | **3** | **42,9** | **4** | **57,1** | **7** |
|  | **total** | **14** | **73,7** | **5** | **26,3** | **19** |
| **total** |  | **45** | **67,2** | **22** | **32,8** | **67** |
| **2017** | **without** | **28-32** | **18** | **62,1** | **11** | **37,9** | **29** |
|  | **>32<37** | **10** | **29,4** | **24** | **70,6** | **34** |
|  | **total** | **28** | **44,4** | **35** | **55,6** | **63** |
| **with** | **28-32** | **11** | **73,3** | **4** | **26,7** | **15** |
|  | **>32<37** | **1** | **50,0** | **1** | **50,0** | **2** |
|  | **total** | **12** | **70,6** | **5** | **29,4** | **17** |
| **total** |  | **40** | **50,0** | **40** | **50,0** | **80** |

Table 7 **Complications connected with intubation and surfactant aplying in 2015 and 2017**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  | **Surfactant** | | | | |
|  |  |  | **Yes** | | **No** | | **total** |
| **Year** | **Intubation** | | **N** | **%** | **N** | **%** | **N** |
| **2015** |  | **28-32** | **10** | **100,0** |  |  | **10** |
| **Yes** | **>32<37** | **2** | **50,0** | **2** | **50,0** | **4** |
|  | **total** | **12** | **85,7** | **2** | **14,3** | **14** |
|  | **28-32** | **1** | **50,0** | **1** | **50,0** | **2** |
| **No** | **>32<37** | **2** | **66,7** | **1** | **33,3** | **3** |
|  | **total** | **3** | **60,0** | **2** | **40,0** | **5** |
| **total** |  | **15** | **78,9** | **4** | **21,1** | **19** |
| **2017** |  | **28-32** | **11** | **100,0** |  |  | **11** |
| **Yes** | **>32<37** | **1** | **100,0** |  |  | **1** |
|  | **total** | **12** | **100,0** |  |  | **12** |
|  | **28-32** | **1** | **25,0** | **3** | **75,0** | **4** |
| **No** | **>32<37** |  |  | **1** | **100,0** | **1** |
|  | **total** | **1** | **20,0** | **4** | **80,0** | **5** |
| **total** |  | **16** | **72,7** | **6** | **27,3** | **22** |

Table 8 **Duration of hospitalisation in days**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **2015** | | **2017** | |
|  | **28-32** | **33-37** | **28-32** | **33-37** |
| **Median** | **42** | **18,25** | **43,5** | **18,2** |
| **Averige** | **44,56** | **23,03** | **45,9** | **20,2** |

In 2015 preterm infants up to 32 gestational weeks were hospitalized on average 44 days (median 42 days) and in 2017-46 days (median 44 days). Older preterm infants in 2015 were hospitalized on average for 23 days (median 18 days) and 2017-20 days (median 18 days).In the group of up to 32 gestational weeks need for oxygen therapy was 2 days longer in 2017 (median 25) and in older preterm two days shorter (median 12 and 10)

Table 9 **Duration of oxigenation in days**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **2015** | | **2017** | |
|  | **28-32** | **33-37** | **28-32** | **33-37** |
| **Median** | **25** | **12** | **25** | **9,5** |
| **Averige** | **26,8** | **13,27** | **28,8** | **11,2** |

**Conclusion**

1. The aproach of treating preterm infants differs in two periods of time. Much more of them in t he year 2107 has been treated less invasively (without surfactant and intubation).
2. Less invasive treatments reduced the incidence of nosocomial infection and the time to introduced complete enteral nutrition.
3. Oxygen therapy for preterm infants up to 32 weeks extended in the year 2017 for two days and in the older group two days shortened.
4. The duration of hospitalization for preterm infants up to 32 weeks extended for 2 days, and shortened for 3 days in the older group.
5. Despite the treatment with less invasive methods (less intubation and less surfactant mostly with LISA method) there are no statistically significant differences in the number of complications in the group from 28 to 32 gestation weeks during two opserved periods.
6. In 2017, there were a greater number of premature retinopathies in gestation group of 31 and 32 weeks (compared to the year 2015 when it occurred in those of 28 to 30 weeks).
7. The proportion of necrotic enterocolitis and severe cerebral hemorrhage is the same despite a different approach to treatment.
8. Non invasive mechanical ventilation allow les invasive aproach (sometimes without surfactant) to gentle preterm infants and prevents long lasting consequences.