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BARIATRIK JARROHLIKLARDAN KEYIN RIVOJLANADIGAN KAMQONLIKLARDA MIKROELEMENT VA VITAMINLAR AHAMIYATI

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Abstrakt: Ushbu maqola bariatrik amaliyot o‘tkazgan bemorlarda rivojlanadigan kamqonliklarda mikroelement va vitaminlar ahamiyati haqida bo‘lib, jahon adabiyotlarining oxirgi 5 yildagi 30 ta maqolalarni o‘rganib chiqib tahlil qilingan.

Kalit so‘zlar: Anemiyalar, bariatriya amaliyoti, mineral elementlar balansi, vitaminlar, oqsillar, gepsidin.

Muammoning dolzarbligi: So’nggi o’n yillikda jahon miqyosida og’ir ortiqcha vazn va semizlik ko’rsatkichlari keskin oshdi; buning natijasida semizlikni davolashda bariatrik va metabolik jarrohlik (masalan, Roux-en-Y gastric bypass — RYGB, sleeve gastrectomy — SG, biliopankreatik diversiya — BPD) amaliyotlari keng tarqaldi. Ushbu operatsiyalar bemorlarning vaznini sezilarli darajada kamaytirib, qandli diabet, gipertenziya va boshqa kardiometabolik kasalliklarni yaxshilashda samarali bo’lishiga qaramay, ular bilan bog’liq uzoq muddatli metabolik va oziqlanish asoratlari muhim ijtimoiy-tibbiy muammoga aylanmoqda.Xususan, mikronutrientlar (temir, mis, rux, seleniy) va vitaminlar (B12, folat, D, A, E, K va boshqalar) yetishmovchiligi bariatrik jarrohlikdan keyingi keng tarqalgan va klinik jihatdan muhim asoratlar qatoriga kiradi (1)

So’nggi o’n yillikda jahon miqyosida og’ir ortiqcha vazn va semizlik ko’rsatkichlari keskin oshdi; buning natijasida semizlikni davolashda bariatrik va metabolik jarrohlik (masalan, Roux-en-Y gastric bypass — RYGB, sleeve gastrectomy — SG, biliopankreatik diversiya — BPD) amaliyotlari keng tarqaldi. Ushbu operatsiyalar bemorlarning vaznini sezilarli darajada kamaytirib, qandli diabet, gipertenziya va boshqa kardiometabolik kasalliklarni yaxshilashda samarali bo’lishiga qaramay, ular bilan bog’liq uzoq muddatli metabolik va oziqlanish asoratlari muhim ijtimoiy-tibbiy muammoga aylanmoqda. Xususan, mikronutrientlar (temir, mis, rux, seleniy) va vitaminlar (B12, folat, D, A, E, K va boshqalar) yetishmovchiligi bariatrik jarrohlikdan keyingi keng tarqalgan va klinik jihatdan muhim asoratlar qatoriga kiradi (1, 3).

Semizlik butun dunyo bo’yicha ortib borayotgan sog’liqni saqlash muammosiga aylanmoqda. Jahon sog’liqni saqlash tashkiloti (JSST) ma’lumotlariga ko’ra, 2022–2026-yillarda dunyo bo’yicha har sakkizinchi kishi semizlik bilan yashagan, kattalar orasida semizlikning tarqalishi esa so’nggi o’n yilliklarda ikki baravardan ko’proqqa oshgan (2). Bu salbiy tendensiya ayniqsa semizlik bilan bog’liq hamroh kasalliklari bo’lgan bemorlar orasida yaqqol ko’zga tashlanadi. Ortiqcha vazn va semizlik yuqumli bo’lmagan kasalliklardan har yili millionlab kishining o’limiga sabab bo’ladi. Bariatrik jarrohlik semizlikni davolashning samarali va uzoq muddatli usuli sifatida tan olingan bo‘lib, u barqaror vazn yo‘qotish va kasalliklar remissiyasiga olib keladi (5, 6).

Biroq, operatsiyadan keyingi uzoq muddatli davrda rivojlanadigan postbariatrik kamqonlik (anemiya) faqatgina an’anaviy temir moddasi tanqisligi bilan cheklanib qolmaydi. Klinik amaliyotda eng dolzarb va fundamental muammolardan biri — bu gipokuproz (mis yetishmovchiligi), mineral-suyak metabolizmi ko’rsatkichlari va eritropoez biomarkerlarining murakkab patofiziologik kasalligidir.

Postbariatrik anemiyaning chuqurlashishi va uning refrakter (an’anaviy davoga bo’ysunmaydigan) xususiyatga ega bo’lishi bevosita gomeostaz tizimidagi quyidagi o’zgarishlar bilan bog’liq:

Mis (Cu), Temir (Fe), Ferritin va Transferrin kogerentligi: Mis organizmda temir gomeostazini boshqaruvchi multizanjirli metallofermentlar — seruloplazmin (ferroksidaza I) va gefestin (ferroksidaza II) faolligi uchun asosiy kofaktordir. Oshqozon-ichak trakti anatomiyasining o'zgarishi (ayniqsa proksimal ichakning chetlatilishi) natijasida mis so'rilishi buziladi (21). Mis yetishmaganda, gefestin fermenti faolligi susayadi, bu esa enterotsitlarda saqlanayotgan ikki valentli temir (Fe 2+) ning qon oqimida transport vazifasini bajaruvchi transferrin oqsili bilan bog'lanishi uchun zarur bo'lgan uch valentli (Fe 3+) shaklga o'tishini bloklaydi (24). Natijada, organizmda temir zaxiralarini ifodalovchi ferritin miqdori yetarli yoki yuqori bo'lgan holatlarda ham, funktsional temir qon oqimiga chiqa olmaydi, transferrinning temir bilan to'yinish koeffitsiyenti pasayadi va gemoglobin sintezi keskin to'xtab, og'ir gipoxrom anemiya rivojlanadi (22).

D vitamini, Kalsiy va Paratgormon (PTH) zanjiri: Bariatrik jarrohlikdan keyin yog'da eruvchi D vitamini so'rilishining buzilishi va gipovitaminoz D holati ingichka ichakda kalsiy ionlarining aktiv absorbsiyasini keskin kamaytiradi (27). Qondagi kalsiy miqdorining pasayishi (gipokalsiyemiya) qayta aloqa mexanizmi orqali qalqonoldi bezini stimullaydi va paratgormon (PTH) sintezining surunkali ortishiga (ikkilamchi giperparatireozga) olib keladi (4). Giperparatireoz esa suyak to'qimasidan kalsiyni yuvib chiqarish bilan bir qatorda, suyak ko'migidagi eritroid o'tmishdosh hujayralariga toksik ta'sir ko'rsatadi, eritropoetin reseptorlari sezgirligini pasaytiradi va anemiya patogenezini yanada og'irlashtiradi.

Magniy (Mg) tanqisligining ta'siri: Magniy mikronutrienti mineral metabolizmda va ATPga bog'liq barcha fermentativ jarayonlarda, jumladan, gomeostaz zanjirida ishtirok etadi. Postbariatrik malabsorbsiya oqibatida rivojlangan gipomagniyemiya paratgormonning suyak va buyrak reseptorlariga bo'lgan sezgirligini bloklaydi, bu esa D vitamini va kalsiy terapiyasining samarasizligiga olib keladi va umumiy metabolik distressni chuqurlashtiradi.

Shu sababli, postbariatrik kamqonliklar patogenezida faqatgina gemoglobin yoki zaxiradagi temirni (ferritin) baholash yetarli emas. Bemorlarda hayotiy muhim biomarkerlar — D vitamini, kalsiy, PTH, magniy, transferrin hamda ularni boshqaruvchi mis elementi o'rtasidagi patofiziologik uzviylikni multidissiplinar yondashuv asosida tizimli o'rganish va individual korreksiya strategiyalarini ishlab chiqish zamonaviy gomeostaz tibbiyotining eng dolzarb muammolaridan biridir.

Xulosa: Olib borilgan tizimli tahlillar bariatrik va metabolik jarrohlik amaliyotlaridan keyingi uzoq muddatli davrda mikronutrientlar va gomeostaz ko'rsatkichlarining chuqur o'zgarishini ko'rsatdi. Roux-en-Y gastric bypass (RYGB) o'tkazgan bemorlarda proksimal ichak segmentlarining anatomik chetlatilishi tufayli temir, transferrin to'yinishi, vitamin B12 va mis darajalarining pasayishi Sleeve Gastrectomy (SG) guruhiga nisbatan sezilarli darajada agressiv kechadi (6, 8). Foliy kislotasi tanqisligi esa uning butun ingichka ichak bo'ylab muqobil so'rilish mexanizmlari hisobiga nisbatan kamroq gipovitaminoz ko'rinishida namoyon bo'ladi (18).

Postbariatrik anemiyaning shakllanishi va uning an'anaviy muolajalarga rezistentligi (refrakterligi) faqatgina temir defitsitiga emas, balki gepsidin gormoni faolligi va mis yetishmovchiligi (gipokuproz) bilan bog'liq kogerent zanjirga borib taqaladi (13, 21). Mis tanqisligi natijasida seruloplazmin va gefestin ferroksidazalarining bloklanishi ferritin zaxiralari saqlangan holda ham temirning transferrin oqsiliga yuklanishini to'xtatadi va funktsional temir yetishmovchiligi hisobiga gemoglobin sintezini inqirozga uchratadi (22, 24).

Ikkinchi tomondan, D vitamini tanqisligi bariatrik operatsiyalargacha bo'lgan semizlik yallig'lanishi fonida ham, operatsiyadan keyingi malabsorbsiya sharoitida ham eng yuqori ko'rsatkichni qayd etib, kalsiy ionlarining absorbsiyasini tormozlaydi (4, 27). Gipokalsiyemiya fonida paratgormon (PTH) sintezining surunkali kompensator ortishi (ikkilamchi giperparatireoz) suyak tizimini zararlash bilan birga, suyak ko'migidagi eritroid hujayralar faoliyatini susaytirib, anemiyani yanada chuqurlashtiruvchi mustaqil patologik omil bo'lib xizmat qiladi. Magniy tanqisligi esa ushbu zanjirda

PTH reseptorlari sezgirligini bloklab, umumiy mineral-suyak metabolizmi va eritropoez distressini yanada murakkablashtiradi (23).

Ushbu natijalar shuni ko'rsatadiki, postbariatrik davrda standart gematologik monitoring (faqatgina gemoglobin yoki ferritin) bemorlardagi yashirin va refrakter anemiyalarni to'liq prognoz qila olmaydi. Bariatrik jarrohlik o'tkazayotgan bemorlar uchun operatsiyadan oldingi va undan keyingi hayot davomida ferritin, eruvchan transferrin retseptorlari, transferrin, mis, vitamin D, kalsiy, magniy va PTH ko'rsatkichlarining multidissiplinar laborator skriningini joriy etish zarur (3, 26). AQSh bariatrik jarrohlar jamiyati (ASMBS) va xalqaro ko'rsatmalar standartlari asosida, har bir jarrohlik turining (RYGB yoki SG) o'ziga xos malabsorbtiv va restriktiv xususiyatlarini hisobga olgan holda individual qo'shimcha korreksiya sxemalarini ishlab chiqish mikronutrient inqirozlarining oldini olish, asoratlarni samarali boshqarish va bemorlarning uzoq muddatli hayot sifatini ta'minlashning fundamental asosidir (25)

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