Lint and Particulate Impact on Surgical Site Infection and Wound Healing

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Foreign debris interferes with optimal wound healing and contributes to surgical site infections. This can be caused from foreign debris and particulates in the operating room. This not only can cause surgical site infections, adhesions, granulomas and exaggerated scar formation but also can result in chronic consequences, increased hospital stays, increased cost of treatment, repeated surgery as well as litigation.

In a normal healing incision a fibrin web is formed facilitating movement of white blood cells, fibroblast cells and others needed for clean up and new tissue construction called granulation tissue. Collagen is deposited for strength and integrity, new cells fill in the space, fluids recede and fibrin threads pull wound edges together. Finally fibrin exudes self-destruct enzymes and dissolves leaving string collagen in place. Scar tissue becomes softer as swelling, fibrin and extra cell infiltrates leave.

When cell particulates are present, cell injury occurs due to physical abrasion of the particles, irritant or allergic reactions to chemical on particles and white cell reactive enzymes dispersed onto healthy tissues. Inflammation is amplified causing increased swelling and an influx of more white blood cells to clean up dead cell debris. More fibrin is deposited to handle the increased area affected. Less oxygen equals less collagen deposited. The fibrin does not adequately organize and particles interfere with fibrin self-destruct signal. This results in increased size of scar; decreased scar strength, resilience and toughness; impaired and delay in healing and increased risk of infection.

Some examples of particulates in the Operating Room are bone fragments, suture fragments, hair, dust, glove powder, lint, fibers and tissues from poorly cleaned reusables. Particles are not clean and pure. They may have coatings or absorbed substances such as biocides, disinfectants, soaps, detergents, fabric softeners, antistatic treatment, fire resistant treatments, fluid resistant treatments, color dyes or anything absorbed from CS prep or in the Operating Room.

Many complications or reactions result from particulates in wounds. Foreign bodies of lint or glove powder can result in a granuloma or adhesion formation. This has been noted in numerous types of surgery: abdominal, liposuction, kidney transplants, orthopedics and ophthalmic surgery. This has resulted in kidney refections, thrombus formation (mitral valve replacement), stent implantation, granulomatous endocarditis (cardiac catheterization), granulomas (liposuction, eye surgery), intra-articular inflammation (joint surgery) only to mention a few. The outcome results in complications, repeated surgery and even death. Particulates also increase the risk of infection by providing a vechicle to transport microorganisms and reduce the surgical wounds resistance to infection.

We can all be proactive in reducing particulates in the operative field. Some of these ways are:

-low linting fabrics used throughout
-powder free gloves
-hair completely covered on head and face
-wear appropriate attire appropriately
-meticulous cleaning of all theatres, furniture, equipment, floors etc.
-low lint cleaning cloths, towels , blankets
-wet vacuum when possible- never dry sweep
-all instruments and devices thoroughly cleaned of particulates
-reduced traffic flow in rooms
-reduced people in rooms-have in room before procedure begins
-keep doors closed
-air filtration system adequate
-appropriate temperature and humidity control
-reprocessing of implants to a minimum
-no cardboard or other particulate generating products around operative area
-keep non-sterile storage area clean
-remove food from theatres

These are a few ways we can all protect our patients from complications resulting from particulates and ensure a healthy outcome following surgery. Reducing particulates promotes optimum healing. With the best practices, the right product and devices, and continued improvements everyone is a winner!