Let There Be Light (In the OR)

One could say that Thomas Edison has spoiled us. Since the emergence of the electric light in the early Twentieth Century, we have become so accustomed to instant illumination that brief black or brown outs are not just inconveniences, but can completely cripple the homes, businesses and cities of modern man. Of course, no one is suggesting that we go back to candlelight, quaint as that may seem.
Even after the invention of the electric light, and the subsequent improvements and advancements in lighting technology, providing efficient and effective illumination in the Operating Room has remained a challenge. While the electrically lighted OR did revolutionize surgery, it is the optimal visibility of the patient in general and the surgical site specifically, that directly effects the time, technique, and outcome of a given procedure.

Today surgeons have a wide variety of choices when it comes to surgical lighting. Major ceiling mounted surgical lighting systems can deliver illumination across the entire sterile field, and also be adjusted to concentrate light on the surgical site itself. Headlight systems allow light to be focused directly where the surgeon needs it most. Technological advancements over the past few years to both styles of lighting systems now enables them to provide color correct light that improves tissue differentiation with little or no radiant heat from the bulb. This can make procedures easier, faster, and far more comfortable for both the surgeon and the patient.
The surgical light and light source market is quite broad now, with dozens of manufacturers and marketers competing to meet the ever growing needs of surgeons. As a result, surgical lighting technology continues to trek ahead. Recent years have seen the emergence of deep cavity illumination devices, ever more flexible lighting systems, and even headlight systems that unshackle the surgeon from the traditional fiber optic light cable. Here is a look at some of the latest developments in lighting technology available to the modern OR.

Surgical Lighting Systems

Berchtold’s CHROMOPHARE&reg series offers both major and minor surgical lights for acute interventional care areas such as the OR and ER. With a wide variety of light head sizes, technologies, suspension systems, and convenience options, they offer surgical lighting for virtually any procedure.

The X65 is built around the extremely efficient gas-discharge technology and delivers among the coolest major surgery lighting currently available in the United States. Its 75 watt bulb creates intense white light with minimal heat to the surgical field.

The D-Series surgical light features Berchtold’s new BRITe&#153 IR-reflective tungsten-halogen lighting system, producing maximum light and minimum heat from a single low-watt bulb. Using just 150 watts of power consumption, the D-Series light produces 50 percent more light per watt than conventional halogen and less heat than almost any other major surgical light on the market.

At 160,000 lux, Berchtold’s lights offer maximum brightness, and by offering a dimmable light with highly adjustable spot (6.7 inches to 11.8 inches on the D660 model), they also provide the flexibility to accommodate both small and large sites, without the glare potential of fixed spotlights. The mirrored lighting systems’ polygon reflectors add further flexibility by providing great shadow control for deep sites and crowded sterile fields.

Skytron’s surgical lighting systems are designed to provide greater surgeon control while offering the flexibility and integration required in today’s OR. Their Stellar Surgical Lighting provides advanced focusable lighting capability controlled directly by the surgeon in the sterile field, delivering glare-free illumination even in the deepest cavities. Each 23-inch Stellar ST23 surgical lighthead is equipped with advanced, high intensity (130,000 lux) focusable optics providing soft white, high intensity lighting where it is needed most. The lightheads are constructed of an advanced polymer housing that provides smooth lines, durability, and feather light positioning capability. They are equipped with advanced VSRD Optics to deliver

high intensity, shadow free, cool illumination over a wide range of working distances.

The newest addition to Skytron's line of surgical lights is the Nautilus Series. This lighting systems provides the latest in high performance technology, including the advanced SWIRL lens design, delivering hundreds of high intensity lighting segments to the surgical field, culminating together to form a rich and vibrant column of light with extended pattern control and without glare. It can retain deep wound illumination within a uniform 54-inch column of light, with no "hot spots" and easy positioning control.

STERIS's Harmony LA Surgical Lighting and Visualization System provides expandability, flexibility, and performance for technologically advanced operating suites. Features include intuitive controls, Wavelens&#153 technology for optimal focus capability, a faceted cold mirror reflector for shadow control and improved depth of field, and an easy to replace lamp system with backup. The system's LCD control center maintains consistent light quality by compensating for fluctuations in the power supply. It also detects the quantity and types of lightheads and accessories plugged into the system, and performs self-diagnostics.

Getinge USA recently expanded its surgical lighting offerings with the introduction of the ALM X'TEN major surgical light. Designed to provide optimal illumination performance for a wide range of surgeries in a unique, compact design, the X'TEN incorporates a proprietary cross-shaped, easy to position lighthead that is ideal for laminar flow. The light's patented dichroic mirror and micro-lens technology deliver thousands of diverging light beams to create a homogeneous distribution of light and efficient heat management over the entire surgical site. The X'TEN system provides 110,000 Lux of illumination over an adjustable 10- to 12-inch light patch diameter and employs patented LEDinside technology for ambient light applications such as minimally invasive surgery, patient monitoring, and surgical prep. A ring of 26 LEDs provides desirable, adjustable, soft illumination (30, 70, 110 and 150 Lux) that improves screen vision and reduces eye fatigue.

The SYSTEM ONE Orbital series surgical lights from Medical Illumination

International provides four-stage electronic dimming, adjustable pattern size, auto bulb switchover in case of primary bulb failure, and much more, plus the added benefit of continuous rotation from the ceiling center post. The Orbital series is available in Solo, Duo and Trio head ceiling mount models, drastically increasing the capabilities of the system and making it ideal for virtually any surgery setting.

Surgical Light Sources & Headlamps

BFW's Maxenon&#153 Xi 300 system includes the HighBeam TriLens Fiber Optic Headlight, which provides an adjustable spot covering twice the area (at a 16 inch working distance) of other comparable headlights. Lightweight, and with a distinctive low profile, the High Beam provides brilliant uniform light and is available with two headband options. The High Beam is compatible with most loupe oculars and is adjustable from the forehead to the tip of the nose. It comes with a very low-profile contour, 4.5-mm fiber optic cable that fits most US-made light sources.

New to BFW's product line is the High Lite Featherweight fiberoptic headlight, a low-profile headlight with an adjustable spot size that provides incredibly bright light. The headlight is designed to be an ultra-lightweight alternative for the OR, especially for those accustomed to using the company's clip-on Convertible format for ocular loupes. The High Lite allows users to choose between the BFW form-fitted, sturdy and dual-adjustable Classic headband, the soft Breath-O-Prene&reg Sport headband, or the ultra-light clip-on Convertible model. The headlight can be used with the company's Minimax&#153 T3 200-watt quartz halogen light source or, for more intense light, the Maxenon&#153 Xi 300 and Maxenon PowerPlus light sources.

Luxtec offers a comprehensive line of Xenon light sources, headlights and accessories. Their 300 watt 9300 XSP (single port) and 9300 XDP (dual port) light sources boast the highest safety rating possible, and have manual attenuators to control glare or brightness. The use of true white Xenon light eliminates the color-correction concerns inherent with halogen and metal halide lights, and Luxtec's integrated infrared filter reduce radiated heat by upwards of 95 percent.

To further facilitate the modern OR, Luxtec offers complete system packages including light sources, headlights with cameras, DVD recorders, monitors, surgical loupes, head-up Critical Data Viewer units, and towers for the whole package. They can be used in any surgical procedures (except ophthalmic) and can increase productivity and efficiency in multiple surgical settings.

Products For Medicine is a supplier of auxiliary surgical headlights and endoscopic illumination systems designed for many different procedures and disciplines, including the new White Sun 300 watt Xenon light source. The White Sun's universal turret accepts Olympus, Storz, ACMI/Circon, and Wolf cable connectors. As an added convenience for their customers, Products For Medicine offers a free loaner service. If one of their units requires repair, free loaner units will be shipped to the account at Products For Medicine's expense.

The Sunoptics Surgical product portfolio currently consists of two primary categories, illumination and video. The illumination portfolio includes the SolarMaxx Light Source and SolarPlus Headlight Systems, as well as complete line of fiber optic cables. These lighting products complement the company's Solar DMD, SunMicro Camera, VCAP Systems, and line their of Endoscopic Cables to provide a comprehensive, integrated illumination and video system.

Welch Allyn offers a full line of surgical headlights, providing solutions spanning the entire range of surgical specialties. Included in their product offerings are four light sources, two headlights, three headbands, and seven headlight fiber options, each offering distinct advantages in addressing different needs.

Among their offerings are the CL100 and CL300 Surgical Illuminators, which utilize off-axis optical technology, enabling single fiber illumination (SFI). Welch Allyn's SFI headlight uses condensing optics to adjust spot size and increase brightness as spot size is reduced. Also available is their patented Solarc arc lamp technology that delivers Xenon quality light at the cost of a halogen system. Developed and manufactured by Welch Allyn, Solarc Lamps deliver the high color temperature white light of Xenon quality but is twice as efficient, delivering 60 lumens per watt.

With their own line of surgical headlight fibers and a broad range of surgical headlight options, Welch Allyn can not only provides solution for demanding surgical procedures, but can also meet the special needs of each individual surgeon.

New Innovations in Surgical Lighting
Teleflex Medical offers illumination systems, headlamp products, illuminated retractor systems, and light accessories that can be used in a variety of procedures and surgical settings. The XenaLight Illuminator offers the highest quality light with a compact design that affords an easily transportable footprint. The XenaLight features a patented Coolux&#153 port that prevents heat migration. It produces filtered light that gives the truest coloration and allow the surgeon better tissue differentiation.
New to Teleflex Medical's illumination product line is the SaphLITE/RadLITE lighted retractor system, currently designed to provide localized light in saphenous vein and radial artery harvest procedures for cardiac surgery. The SaphLITE/RadLITE System provides reliable tissue retraction and high transmission illumination for the surgical site, delivering strong, uniform, focused light with no glare or washout.

The Halo Cordless Surgical Headlight from Enova Medical Technologies requires no fiber optic cable. Using LEDs, which are solid-state semiconductors rather than bulbs, the headlight gives off no heat and will not dry out patient tissue like xenon or halogen bulbs. LEDs produce an extremely white light and illuminate like natural sunlight. The Halo Cordless Headlight is completely battery powered, fully portable, and can be used in any procedure and any medical market including vascular, uro-gyn, thoracic, plastic, oral surgery, dentistry, and more.

There are currently two versions of the Halo available. The Halo 6000 has a brighter light output, designed to meet the high-performance needs of the hospital OR, and includes the brightest, whitest LEDs and a Crizal-coated front lens for enhanced light transmission. The Halo 5000 brings high-quality, portable light at an affordable price to routine office or exam use. The Halo 5000 delivers 45,000 lux and is ideal for everyday use. Both products provide the same consistently bright white, cool light and all the advantages of cordless, portability and cost-effectiveness.

Lumitex's LightMat&#153 Surgical Illuminator provides deep cavity lighting and brings bright, shadowless, cool light where it's needed—into the surgical cavity. Flexible and malleable, it can be attached to most retractors or instruments. By improving visualization, it helps by saving time and avoiding complications in deep cavities, under flaps, and in lateral margins. It is ideal for use in vaginal surgery, colo-rectal surgery, open bariatric surgery, and reconstructive plastic surgery. The LightMat is now available in Ultra-Thin&#153 measuring 1.5 mm thick and 15.2 mm wide, and Ultra-Brite&#153 which provides a brightness enhancement of more than 50 percent over the existing Ultra-Thin illuminator.
With so many lighting options available to the modern OR, and the ever advancing technology addressing new challenges as they arise, the future looks bright for surgical lighting.

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